

POWER TRANSMISSION DESIGN

MAY 1961

INCLUDING BEARINGS DESIGN/APPLICATION

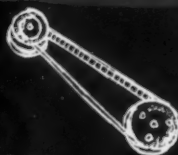
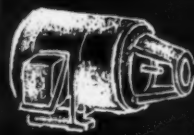
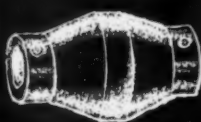
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POWER TRANSMISSION COMPONENTS

- Manufacturer forecasts
- What users need
- Line-up of new products

Special Design Engineering Show Report



ALSO IN THIS ISSUE/Flat pulley is speed control/Add value to design/Here's where to use grease

Read by 40,000 men who specify power transmission products
for original equipment and in-plant applications

in machine design or modernization...

Fawick simplifies clutch problems

... with standardized package design

Fawick Airflex Clutches and Brakes are easiest to use because they are incorporated into simplified *standard packages*, available in a wide range of sizes and capacities, and adaptable to all types of machines.

... engineering assistance

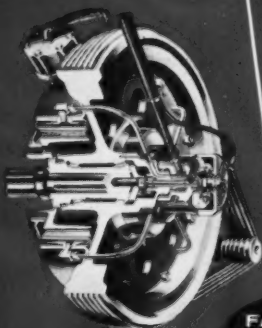
Fawick engineers, at the factory and in the field, are specialists in mechanical power transmission, ready to provide complete engineering service throughout all stages of design or modernization of machine drive systems.

... and increased production through top clutch performance

Fawick power transmission packages provide a sure method to increase production, as proved in thousands of applications in all major industries. Their unmatched performance record is based on drum-type air clutch design which provides instantaneous response, low maintenance, automatic self-adjustment for wear and positive safety.

FSPA (Fawick Standardized Press Application)

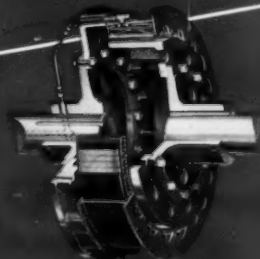
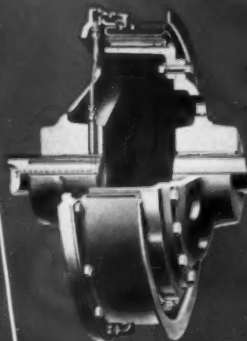
This clutch and brake package is designed for power presses and other high-speed cyclic machines requiring precise control of single, continuous or inching operations. Package includes CB Airflex Clutch, self-energizing CS Brake, Timing Rotorseal and high-speed clutch controls. On presses in the 5 to 150-ton range, FSPA units may be crankshaft-mounted in combination with flywheel, or clutch and brake may be mounted separately. FSPA is available in 25 sizes with torque capacities from 2,040 to 172,000 in.-lbs. at 75 psi.



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CB Airflex Clutch

Standard complete air clutch may be through-shaft mounted, or used as flexible clutch-coupling between shafts as shown. It compensates for both parallel and angular misalignment. Constricting type unit is designed for high-speed cyclic applications and general power transmission on all types of industrial machinery. It is available in 21 sizes with torque capacities from 2,040 to 1,130,000 in.-lbs. at 75 psi.



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Complete clutch package incorporates ventilated, constricting type clutch for extreme heavy duty applications involving high starting loads or sustained slippage. Rapid heat dissipation insures continuously high torque capacity. Unit may be through-shaft mounted or used as a clutch-coupling. Produced in both narrow and wide series, the VC Clutch is available in 14 sizes with torque capacities from 27,000 to 900,000 in.-lbs. at 75 psi.



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This small air clutch package may be through-shaft mounted on all types of cyclic machines having moderate power requirements. Tapered bushing construction in standardized bores and mountings simplifies installation and service problems. Package incorporates the CB Airflex Clutch, is produced in five sizes from 6 to 14-in. diameters, with torque capacities from 2,040 to 19,700 in.-lbs. at 75 psi.

For more information on how Fawick can simplify **your** clutch problem, call your nearest Fawick representative or the Home Office.

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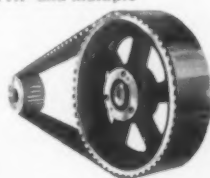
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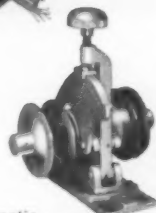
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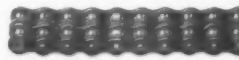
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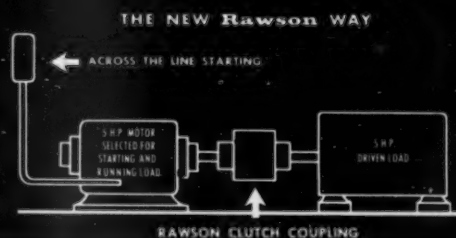
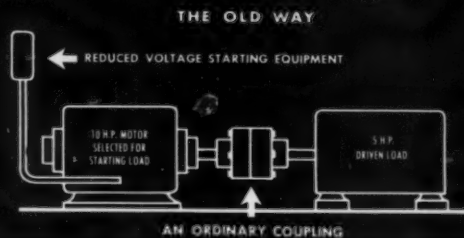
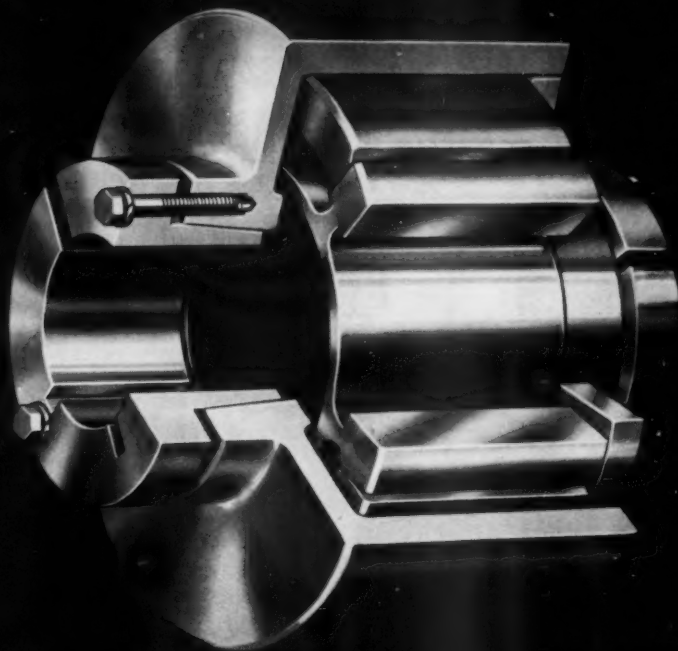
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Sprockets,



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HERE'S WHAT RAWSON CLUTCHES WILL DO FOR YOU

NO-LOAD MOTOR STARTS — Rawson clutches engage at a pre-selected RPM, therefore motors start under "no-load" conditions. Thus, starting current is lower and motor acceleration time is reduced to a fraction of a second.

SMOOTH, SHOCK-FREE STARTING — For any load from fractional to 3,000 horsepower, Rawson starts are smooth and gradual. Even the most delicate equipment and fragile materials are protected.

NO POWER LOSS — At normal running speed, Rawson clutches operate with zero percent power loss. Fluid type clutches have at least a 4% loss.

ACROSS-THE-LINE STARTING — The purchase of costly reduced voltage starting equipment is no longer required. With Rawson "no-load" starts, motors can utilize low-cost across-the-line starting.

YOU CAN USE SMALLER MOTORS — With Rawson "no-load" motor starts and cushioned starting of loads, motor size can be selected for running power only—this may reduce required motor capacity by as much as one-half. Also, on high inertia loads, Rawson clutches eliminate the need for expensive high-torque motors—standard NEMA B motors can be used.

CONTROLLED ENGAGEMENT — Centrifugal force causes a Rawson clutch to gradually engage at a pre-selected RPM as it is brought up to running speed. Engagement can be further controlled by using Rawson clutches having a delayed engagement feature. For internal combustion engines and turbine applications, this delayed engagement feature assures "no-load" during warm-up periods. Delayed engagement Rawsons are also ideally suited for dual drive (standby) installations.

AUTOMATIC OVERLOAD PROTECTION — Power transmission system components are never subjected to the stresses of a continuing overload—Rawson clutches automatically slip until the overload condition is corrected.

FREQUENT MOTOR REVERSAL — Because the Rawson design permits driving in either direction, provides "no-load" motor starts, and assures smooth starting of driven equipment, frequent load reversals are accomplished without overheating the motor.

REDUCED MAINTENANCE COSTS — Shock loadings are absorbed by Rawson clutches—stresses are not transmitted to gear trains or other components of drive system. Thus, expensive repairs and downtime are kept to a minimum.

NEW RAWSON

CENTRIFUGAL CLUTCHES & CLUTCH-COUPPLINGS

Permit Use of Smaller Motors . . . Lower Starting Equipment Costs . . . Provide Cushioned Starting of Driven Equipment . . . Automatic Overload Protection

Rawson clutches and clutch-couplings are of all-metal construction to assure longer life and maximum horsepower capacity per size. They drive in either direction and provide slip-free power at normal operating speeds for applications up to 3000 horsepower.

Because the Rawson design permits "no-load" starting of motors: acceleration time is much faster; starting current is greatly decreased; across-the-line starting can replace costly reduced voltage equipment; and based on lower starting current required, smaller motors can often be employed.

The cushioned starting feature of Rawson clutches frequently permits using NEMA "B" or standard squirrel-cage motors for high inertia loads instead of expensive special high-torque motors. Also, delicate equipment is protected by this elimination of starting shock. On any type of equipment, overloading or jamming will cause a Rawson clutch to slip—protection is automatic and positive.

Rawson clutches function as direct-drive clutch-couplings (in-line, shaft-to-shaft connection) or as indirect-drive clutches through V-belts, chains or

gearing. For internal combustion engines and turbine applications, Rawsons can be furnished with a delayed engagement feature that provides "no-load" starting and warm-up idling. As the driving unit is accelerated, the Rawson will engage at a pre-selected R.P.M. There is no slipping or power loss at normal running speed. This same delayed engagement feature makes Rawson clutches ideal for dual drive or standby applications—automatic disconnect and predetermined engagement speed is provided for both prime movers.

Rawson clutches are simple in design for economy and reliability; they never require adjustment; heat-checking and brake-fade are eliminated; indirect drive clutches utilize standard "QD" type sheaves and direct drive clutch-couplings use "QD" type bushings for ready adaptability to every standard shaft size.

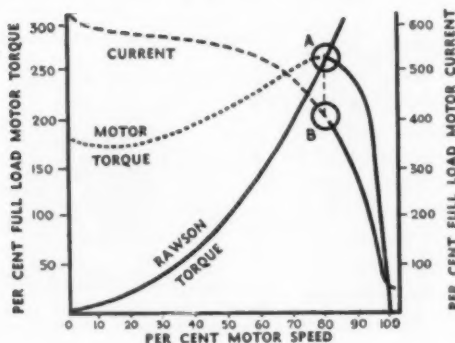
For higher efficiency, lower costs, reduced maintenance and full overload protection, specify Rawson automatic centrifugal clutches and clutch-couplings. These modern centrifugal clutches and their applications are fully described in the Rawson catalog—ask your Rawson distributor or write for your copy.



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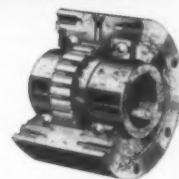


Typical torque and current characteristics of a standard NEMA B motor. Because Rawson clutch does not fully engage until after peak torque speed "A" is reached, motor acceleration time is much faster, peak current period is greatly decreased and motor operates more efficiently "B". Thus, smaller motors and across-the-line starting can be used.

OTHER FORMSPRAG PRECISION POWER TRANSMISSION PRODUCTS

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THE MAGAZINE OF MACHINE DRIVES

MAY 1961

volume 3 number 5

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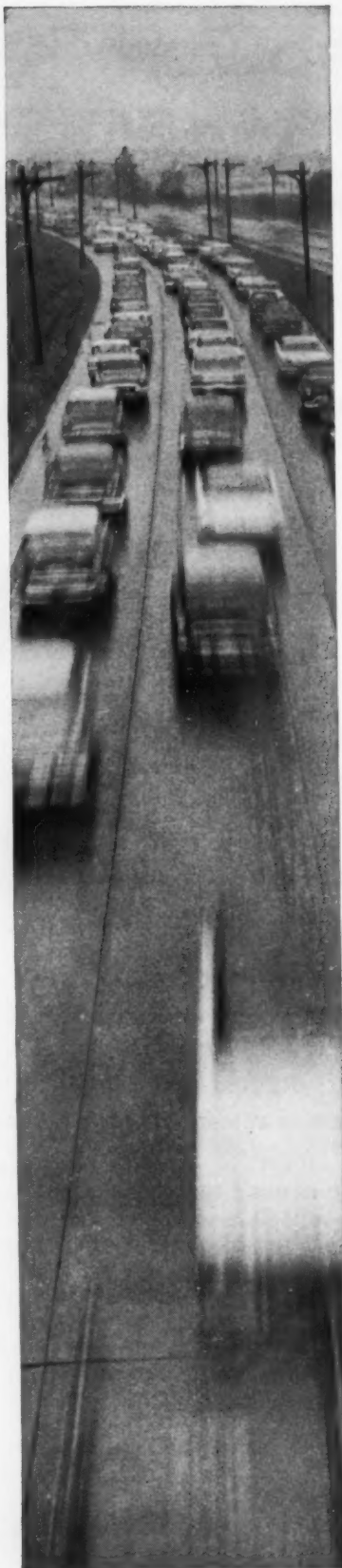
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publishing director

KENNETH MARSHALLproduction mgr.

N. G. KISERcirculation manager

ROBERT GAUVINreader service mgr.

FRANCHISE DEPARTMENT

LEWIS DAVISrepresentative

RICHARD PLANCKproduction

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812 Huron Rd., SU-1-9620

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New York City 17

Rm. 836, 60 E. 42 St., MU 7-3420

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Rm. 704, 520 N. Michigan, WH 3-1655

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Los Angeles 57

Granada Building

672 S. Lafayette Park Pl., DU 7-5104

ALAN T. CAZIER, manager

London, S.W. 1

36 Victoria St., S. W. 1, SU 6072

JOHN A. LANKESTER, manager

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EDWIN M. JOSEPHexecutive v. p.

PAUL ROLNICKvice president

N. N. GOODMAN, JR.vice president

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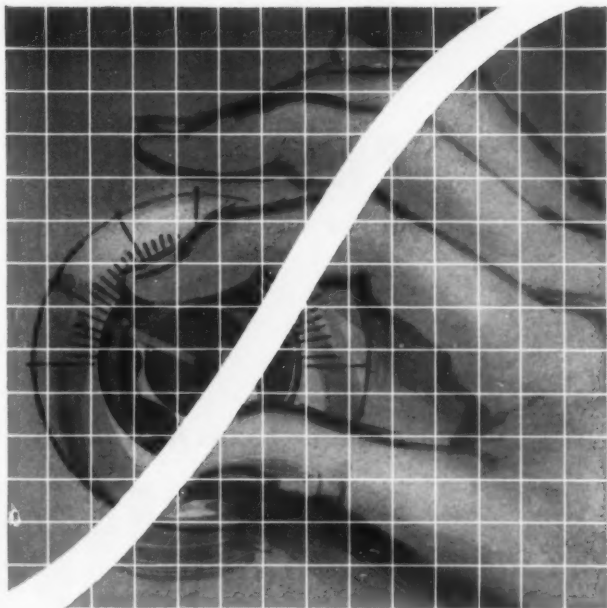
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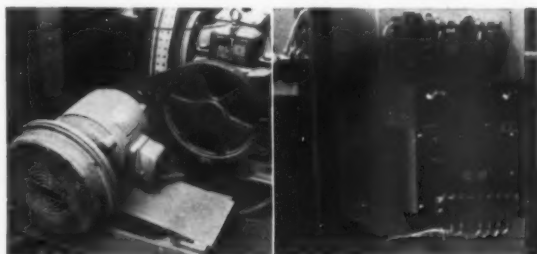
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Warner Motor Brake

Warner Control Panel

example:

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NEWS

from the power transmission field

Worm gear reducer keeps jet ramp on the level



A telescopic corridor which extends from the terminal to the aircraft door gets passengers on and off their aircraft at a tempo more suitable to the jet age than the old wheeled ramp.

But then came a problem. With development of the big jets, the height of the door above the ground varied by about seven feet. How was the corridor to be leveled to planes of varying heights?

P. I. Steel Corp., who build the Jetway corridor, answered this one by designing a belt-driven takeoff from the elevator motor which raises and lowers the corridor. They used this takeoff to power a 40:1 worm gear reducer (made by Foote Bros), which in turn drives a 10,000 ohm rheostat.

The rheostat controls an electrical meter at the operator console, visually indicating the height of the corridor.

Controlling the rheostat with a speed reducer gives great accuracy, according to the manufacturer. The Jetway system can now accommodate planes whose doors range in height from 6 ft 8 in. to 13 ft 6 in., including DC-6Bs, DC-7s, DC-8s and Boeing 720s.

The company has installed 23 of these corridors using the variable height feature, as well as more with standard height, when only one type of plane is used. Newest additions will be 16 at the Los Angeles airport this spring, with 15 more scheduled for Chicago's O'Hare field by the end of 1961.

Glass fiber blades for compressors

Reinforced glass fiber blades for compressor rotor systems are being developed in Britain by Rolls-Royce and Bristol Siddeley. Use will probably be limited to military engines until the technique is proven.

Bristol has already developed production techniques and is rig-testing low pressure compressors of a size comparable to the BS 53 Olympus 30,000-lb thrust engine.

Parts of the BS 53 made of reinforced plastic include cold air deflector nozzles, some lightly loaded sections of the engine casing and the inlet guide vanes.

Rolls-Royce has been investigating plastic blading for some time. The company has claimed a ratio of 16:1 for its small turbo jet lift engines, due mainly to weight saving through use of plastic blades.

Republic expands space engine work

Republic Aviation Corporation has started an expansion of its plasma propulsion activities that will mean the doubling of laboratory personnel and the building of one of the largest electrical propulsion testing facilities in the country.

Alfred E. Kunen, director of the laboratory, expects the expansion to be completed by the end of this year. He also revealed that Republic is now completing a prototype of a "compact" production model plasma pinch engine designed for space application.

The advantage of the plasma engine over other forms of space propulsion is its light weight. Kunen pointed out. Because its thrust ranges between 2,000 and 10,000 pounds per pound of fuel consumed per second—compared to only 300 for the rocket engine—a plasma unit can operate for a longer period, providing the necessary power for accurately guiding a space trip to Mars, Venus, and other planets. Other systems require so much fuel that guidance and control along the flight path is out of the question and the vehicle,



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NEWS

like a bullet, must follow a path limited by the initial aim.

The plasma pinch engine uses nitrogen for fuel and turns it into a plasma—a "fourth state of matter" evolving from gases, a state in which the molecules are broken up into electrons and positive ions. The plasma is compressed or "pinched" by a cylindrical magnetic field until it is shot out of the compression chamber at tremendous velocities.

Self-lubricating metal

A material which "sweats" a graphite film under friction and thus offers something like permanent self lubrication has been developed by the Universal Metallic Packing Co., Ltd., in England.

Called Deva metal, it's made by compacting natural or colloidal graphite powder with primary or alloyed metal powders. Friction causes a graphite film to form on the contacting metal surface. Powders used are various grades of bronze, brass and iron. Operating temperature range is -330 to 1100 F.

The metal is easy to machine, has compression strengths from 12 to 18 tons per sq in. Brinell hardness is between 50 and 82. Coefficients of friction vary from 0.05 under favorable conditions to 0.3 under very unfavorable conditions.

Automatic crown grinding of gears increases output

Development of an automatic external form grinder, which will produce crowned spherical coupling teeth to high precision by grinding, has boosted output from 1 gear every two hours to better than 8 to 10 units per shift at Bell Helicopter Company, Fort Worth.

The grinder developed for this job was built for Bell by the Gear Grinding Division of Michigan Tool Company, Detroit. It incorporates a rocker arm action which

produces a spherical tooth (including the root) rather than a flat tooth shape. The rocker arm controls the grinding wheel movement as it reciprocates through the cut.

Use of automatic downfeed plus automatic wheel dressing not only boosts productivity, but also increases accuracy. With this setup, spherical couplings are being held to within 0.0004 inch on the modified involute form, tooth to tooth spacing within .0002 inch, and maximum spacing error between any two teeth within .0006 inch.

The part produced is the inner coupling for a helicopter tailrotor drive. This drives the tailrotor blade and is designed to allow for operational deflection in the system.

G. E. opens gearmotor annex

General Electric's Gear Motor and Transmission Components Department has opened a new 30,000 square foot annex in Fair Lawn, N. J.

The annex will be used to machine fractional hp gearmotor parts which will continue to be assembled at the main plant in Paterson. The move is to free floor space at the main plant and improve the work flow and machine operation in the larger hp integral product lines.

... from the Russian technical press

Information on the following articles, which appeared recently in Russian technical journals, can be had from the Office of Technical Services in Washington, D. C.

Automatic systems for electric drives of continuous hot rolling mills, from Metallurgizdat, 112 pages. Author presents methods for selecting parameters of drive motors and speed control for various types of continuous hot rolling mills. He discusses modern speed-control systems with magnetic and electronic amplifiers, as well as new systems of grid control for mercury arc rectifiers.

Powdered metal gears. The Byelorussian State Polytechnic In-

ACME

Large Pitch Chain

is "ENDURANCE TESTED" for

Heavy Duty Applications

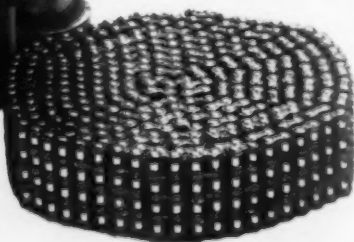
Here's a chain capable of withstanding the severest of abuse and punishing shock loads. Their glass-hard wearing surfaces and rugged heat treated links give you dependable performance under conditions far too grueling for ordinary chains.



In Acme's modern plant, these roller chains are pre-tested for strength and endurance. This is your assurance of efficient performance and durability under unusually severe requirements.

If you have a heavy-duty installation there's an Acme roller chain built with the characteristics necessary to do the job effectively and more economically.

Call your Local Industrial Distributor or our Engineering Department for fast service on your chaining problems.



Write Dept. 28-R
for new ill. 100 page catalog
with engineering section.



RELIABLE CHAIN DRIVES FOR ALL INDUSTRIES

ROLLER CHAINS, SPROCKETS, CONVEYOR CHAINS, FLEXIBLE COUPLINGS, ATTACHMENTS. (Special and Standard)

Circle 2 on Reader Service Card

NEWS

stitute has developed production techniques for tractor oil-pump gears using methods of powder metallurgy. After 2500-3000 hours of work, many of the gears showed no traces of wear.

Lenin Prize papers. Titles include: High molecular compounds of crude oil (S. R. Sergiyenko); Automatic Plant for Making Roller Chains (A. K. Ignatyev).

Special ballistic thruster for Project Mercury spacecraft

Hopefully, a special ballistic thruster recently engineered by Chromalloy Corporation's Propellex Chemical Division will never have to be used. It is an emergency unit to be installed in the Project Mercury spacecraft, and will be called into play only when other means of actuation have failed.



Its thrust causes limited actuator rotation. The tiny unit, slightly more than 2 in. long, $\frac{3}{8}$ in. in dia., is capable of delivering at least 10 lb of thrust, throughout a 0.6-in. stroke. Without electrical leads, the thruster weighs 5 gm.

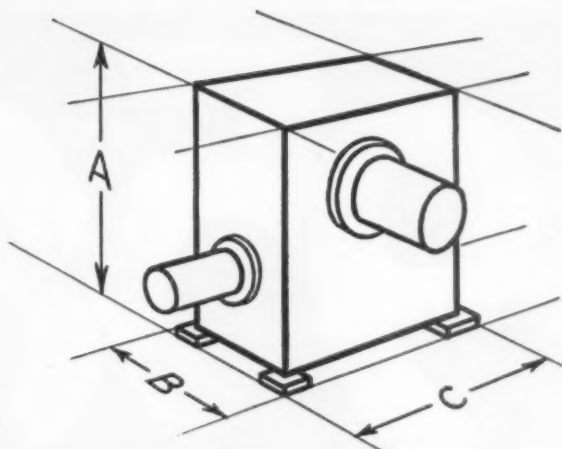
Because its operation must be absolutely guaranteed in time of emergency, the thruster is equipped with a dual electrical ignition system, with two pairs of shielded leads. It can take the extreme conditions of space-vehicle travel, and is completely sealed.

Philadelphia Gear builds research building

Philadelphia Gear Corp. has begun construction of a new gear research building and pattern

Do-It-Yourself...

Let's design a speed reducer today



So you can't find a speed reducer to fit your latest brainchild without ruining the design? Doggone manufacturers all build reducers too big to fit into those few cubic feet you've got left for the reduction unit back behind the double-ended dingbat?

Revolt! Design your own! Show 'em!

By George, design it yourself and it'll fit. How? Well, you know your size limits. Draw the biggest box that'll fit the space and you've got your reducer housing specifications.

Now you need gears that will (1) transmit the needed horsepower under all operating conditions, (2) provide the ratio your machine requires and (3) fit the space that's available. You'll soon discover that there are limits to what gears can do in transmitting horsepower. The cheapest answer is parallel shaft helical gears. If they'll fit you're in clover. But they take the most room, especially when you're out of the fractional hp range. The right angle worm and gear combination is the most compact drive arrangement.

Here again you have a choice. Cylindrical worm gearing is often used, and if it'll do the job, is worth consideration. But it's not the most compact possibility. The best way to shrink gears and still carry the load is the double-enveloping worm gear design. Both worm and gear are throated and the two literally wrap around each other. This brings center distance of the two shafts closer together and you can put them inside smaller housings.

Does this reduce load capacity? No sir! You

can carry the same load with center distances up to 33% smaller than those of cylindrical worm gears. Or use the same center distance and carry a greater load. Will these gears hold up in operation? Sure, if you beef up the teeth, the bearings and the housing. Use straight-sided worm and gear teeth and you'll get all the strength there you'll ever need. Use large taper roller bearings with real B-10 life. Use a reinforced, heavy wall housing that won't distort under load. Put fins on it for added cooling and increased thermal horsepower capacity to meet your needs. Now, put the whole thing together and you've got a speed reducer that's a dilly.

Designing your own speed reducer give you a headache? Looking for an easier way? There is one. Someone's already done exactly what you're talking about. You can order that compact speed reducer right off the shelf. Where?

Cone-Drive Gears, that's where!

Yes sir. They stock double-enveloping worm gear speed reducers from fractional to 665 hp. Standard ratios from 5:1 to 70:1 in about 15 increments, all interchangeable in any type housing of a given center distance. Worms over and worms under. Gear shafts vertical, too. Single- or double-extended output shafts, or shaft mounted. Over 200,000 combinations possible. Wow! Just about anything you want.

Better get Cone-Drive's new speed reducer catalog that details everything. Ask for Bulletin CD-218. Cone-Drive Gears, Div. Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.

956

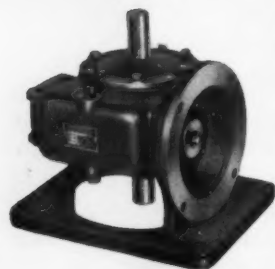
different
motorized
speed reducers

available from stock

Yes! 956 different combinations of Perfection Motorized Worm Gear Speed Reducers are available for immediate delivery, *from stock*. Ratios range from 5 to 1 to 60 to 1, in capacities from 1/6 H.P. to 5 H.P.



Perfection "C" Flange Reducers may be ordered complete with motor or without motor, to be used with a motor of your own choice.



Flanged motor reducers offer the maximum in compactness, rigidity and adaptability. Through the use of standard NEMA face mounted motors, complete interchangeability between motors is provided. Motor maintenance is possible without disturbing the drive and reducer. Motor assembly is fast and positive with no alignment problems.

Write for your free copy of our new 28 page catalog containing illustrations, charts and tables to help you choose the right Reducer for your particular application. Ask for Bulletin No. M-140.

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AMERICAN STOCK GEAR DIVISION
PERFECTION GEAR COMPANY, HARVEY, ILLINOIS

Circle 58 on Reader Service Card

NEWS

shop. It will be adjacent to the Corporation's recently completed manufacturing plant and offices in King of Prussia, Pa., which were occupied in 1960.

The new building will take up some 60,000 square feet of floor area on one level. It will be occupied in mid-1961. The additional facilities will be used to perform vibration-free testing of gear trains for radar antenna and radio telescopes.

Koppers Co. takes over Thomas Flexible Coupling

Acquisition in January of controlling interest in the Thomas Flexible Coupling Co. by Koppers Co., Inc. brings together three well-known names in couplings—Fast's, Holset and Thomas.

Fast's gear-type coupling, made by Koppers, is widely used in heavy industry, while the Holset torsionally-resilient coupling, for which Koppers has U. S. rights, is familiar to both English and American power transmission designers.

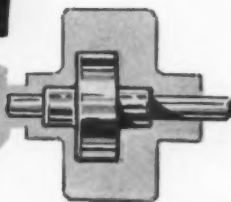
Business news in brief

... **Morse Chain Co.** is producing a line of stock gears at their new Eberhardt-Denver plant. These are 20° pressure angle gears, but will be priced competitively with 14½° gears. Present plans call for gears in the 3 to 20 pitch range. Types to be produced are spur, bevel, miter sets (both straight and spiral), helical and worm and gear sets.

... **Ohio Gear Co.** has opened a new West Coast distribution center in San Francisco. Aim is to cut delivery time for stock gears and speed reducers in the eleven western states.

... **Boston Woven Hose and Rubber Div.** of the American Bilrite Rubber Co. has appointed Meissner Industrial Supplies, Inc., Wichita Falls, Texas a distributor. ... **Dayton Industrial Products Co.** has established a new regional sales office and warehouse at Linden, N. J.

NEW BRAUN



FOR CENTRIC CLUTCHES

A complete newly designed line of standard unit clutches . . . smaller in size with increased H. P. and R. P. M. ratings . . . with greater price economy.

Expert design, improved materials and manufacturing makes possible these smaller size units with comparable H.P. and R.P.M. ratings and application values of the former larger size clutches.

Included in the new line are —

- **TYPE A HEAVY INDUSTRIAL CLUTCH-COUPPLINGS** for dependable motor drive service on heavy equipment. Also included are spring controlled units for engines, turbines and dual drives.
- **TYPE AVL HEAVY INDUSTRIAL LIFT-OUT CLUTCH-COUPPLINGS** for motor drives — units that permit lift-out of either the driver or driven members without telescoping the entire drive, when disassembly is required.
- **TYPE B CLUTCHES FOR INDIRECT POWER DRIVES** — for every indirect need where pulley, sheave, sprocket or gear is involved.

Get complete details on the "New Braun" Centric Clutches. Send for bulletin on type required. May we help to solve your drive problem?

- **ALSO AVAILABLE — TRIG-O-MATIC OVERLOAD RELEASE CLUTCHES.** They provide overload protection by automatically disconnecting the load, instantaneously shutting down the power drive, signaling the machine overload and maintaining indexing. Send for Bulletin #304.

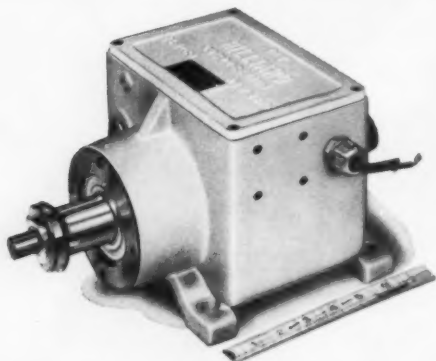


CENTRIC *Clutch Company*

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Engineering
Show
Detroit
May 22-25

**A complete, packaged unit
that gives you precise control
of intermittent motion from
a constant rotary power source!**

Built-in features:

- Contains all the parts in one package.
- Can be installed as easily as a motor and needs only electrical connection.
- Self-lubricating for long life of 40,000,000 or more cycles.
- Operating speed from 40 to 400 R.P.M.
- Torque capacity 36 ft. lbs.
- No cumulative error in cycling.
- Instant engagement.
- Mount with direct coupling connection or use with belt, chain or gear drive.

Can be installed on existing equipment, designed into new machinery and re-used after production line changes.

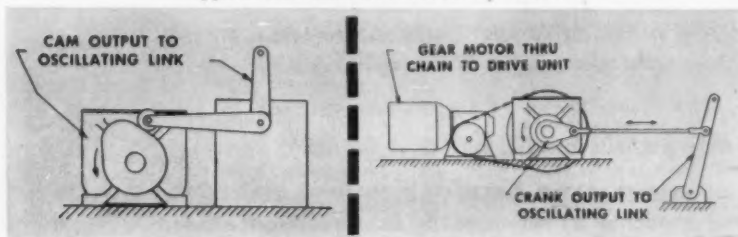
A single package unit that gives you precise control of intermittent motions . . . oscillate or repeat . . . clip and bend . . . shear or slash . . . raise or lower . . . index and position . . . from a constantly rotating source of power.

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Write on your letterhead stating your intermittent motion problems and we will provide complete information.

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Basic Unit Price \$289.00

Optional accessories extra

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COMING EVENTS

MAY

- 9 Society of Plastics Engineers Technical Conference "Plastics in the Automotive Industry," Detroit, Mich.

- 8-9 American Society of Mechanical Engineers, Lubrication Symposium Deauville, Hotel, Miami Beach, Fla.

- 10-12 American Society of Mechanical Engineers, Production Engineering Conference, Royal York Hotel, Toronto.

- 11-13 American Institute of Industrial Engineers, 12th Annual National Conference and Convention, Sheriton-Cadillac Hotel, Detroit.

- 22-25 American Society of Mechanical Engineers, DESIGN ENGINEERING CONFERENCE AND SHOW, Cobo Hall, Detroit.



JUNE

- 4-9 Society of Automotive Engineers, Summer Meeting, Chase Park Plaza, St. Louis, Mo.

- 4-7 American Gear Manufacturers Association, Annual Meeting, The Homestead, Hot Springs, Va.

- 8-9 National Electrical Manufacturers Association, Western Conference, Biltmore Hotel, Los Angeles.

- 11-15 American Society of Mechanical Engineers, Summer Annual Meeting, Statler Hilton Hotel, Los Angeles.

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Cullman Distributors are located from coast to coast and border to border; therefore you are assured of always getting fast service on Cullman power transmission products. When you want Sprockets, Roller Chains, Flexible Couplings — call on Cullman for prompt delivery.

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Circle 5 on Reader Service Card

2007-A

A close look at POWER TRANSMISSION COMPONENTS

Special Design Engineering Show Report

- ▶ **MANUFACTURERS' FORECASTS**
- ▶ **USERS' NEEDS**
- ▶ **WHAT'S AT THE SHOW**

Industry has poured \$20,000,000 into this year's Design Engineering Show at Cobo Hall, Detroit. An expected 22,000 people will attend the show, coming from 15 different countries. Do the makers really have something new and different to show? What are the visitors looking for? What will they find?

Power Transmission Design editors have been out, delving deep into both sides of the field. We've been learning what manufacturers of transmission equipment will be introducing . . . what they think they'll need to produce in the future. We've been learning what their customers want . . . what they hope they'll see at future shows.

TRENDS IN PRODUCT DESIGN

Manufacturers who looked into our crystal ball saw trends that were clear and bright. They saw more specialization, higher power trans-

Let's identify ourselves as an Industry

Strong segments of the industry have found it profitable to organize as a group; there are still many who have not yet realized the potentialities. There is, in fact, no overall group that can speak for the whole of the power transmission industry.

This was brought out in a recent conversation between our editors and Mr. D. A. Hendrick, Chief of General Components Branch, General Industrial Equipment and Components Div., U. S. Dept. of Commerce. He said:

"We have the common problem of convincing people that a mechanical

power transmission industry exists. There are segments, and overlapping segments, that are well known. In my work of trying to represent this industry to the Government, however, we do find people who do not associate gears, speed reducers, chains, and so on, as one broad industry."

Here are some of the problems that Mr. Hendrick encounters.

"We are working on a new Tariff Classification Study for Congress. We find that power transmission chain has long been coded with wire and forged chain. This is bad for the industrial chain manufacturers. Gear drives, plain bearings, and a few other items were in another section of the study. Many items were lost in the 'all other' category.

"No one from the industry took enough interest to be sure that each power transmission product was properly represented in the Tariff Bill.

"In the ball and roller bearing industry, we have excellent cooperation in a statistical program. They find our summaries invaluable for production planning and forecasting.

"On the other hand, we were asked to help another segment of the power transmission industry, in connection with the General Agreement on Tariffs and Trade. No current information was available, so we were unable to contribute very much."

Industries are increasingly becoming aware of the economics of their field. They are interested in total production, total imports, exports, and so forth. They want all the marketing information they can get. One of the best sources can be the U. S. Dept. of Commerce. D. A. Hendrick suggests two ways to make the most of the Department's services:

1. Maintain contact with him, and let him know how the industry feels about various situations.
2. Develop a statistical program for the industry.

Editor's note:

We believe that helping the power transmission industry to be recognized is one of the fundamental purposes of *Power Transmission Design*—the magazine that specializes in Power Transmission.

A LOOK AT COMPONENTS

mission-to-weight ratios, and booming service industries. Here are some typical comments:

"Our design efforts will be directed more than ever, towards smaller, more accurate, products. Belts, sheaves, chains and sprockets, must all come down in size, and stay up in performance."

"Tomorrow's industrial needs will demand faster, more compact, higher-capacity, bearings. Tolerances will be tighter, temperatures higher. Our research labs are already preparing us for demands for bearings to run at 40,000 rpm and 1,000 F."

"There are two trends. Designers are specifying more complicated bearings and more unusual configurations. At the same time, users of power transmission equipment are attempting to promote more standard designs, and to eliminate over-complex design features. In our laboratories we are working on gas bearings, and assemblies in which ball bearings are integrated into the components. We hope to reduce parts, and to refine our tolerances."

"The bearing industry is stable. Only minor modifications are ever made, and most of these involve seals."

"We see the sleeve bearing gaining new acceptance and importance."

"We hope to expand our line of drive tensioners and idlers. At one time, a customer needing a tension device had one "home-made." Now, our low-cost production item is selected, and we think more and more people will specify them in the future."

"No product stays in the lead very long. New materials, and miniaturization will constantly tumble the order of merit of power transmission products. A research lab is becoming a vital necessity for any manufacturer."

"Designers are demanding higher shaft speeds, in smaller units. Interest in packaged units is increasing. For the first time, electric brakes and clutches can be sold on a cost-competitive basis with mechanical units. Previously, they relied on their smaller size and higher efficiency for their sales."

"All the signs we've noticed point to automatic control. More light-vehicles are incorporating variable-speed drives; More variable-speed applications are including automatic torque converters."

"Power transmission components will have to use less manpower in the future, and operate faster. Automatic transmissions and remote controls will be the major advance of the immediate future.

WHAT THE USER WANTS

Many of our readers are concerned with the field problems that develop in power transmission products.

"When you're on the firing line," says the chief engineer of a large company, "you see problems develop with existing products, and you know of improvements that would be useful. But," he complains, "manufacturers hardly ever get to hear of them." With this same thought in mind, *Power Transmission Design* editors have undertaken a far-reaching field survey. On the East coast, Henry Lefer, and on the West coast, Scholer Bangs, our regional editors, sought out designers and users of Power transmission equipment.

"What problems," they asked, "would you like the manufacturers to hear about?"

The demand is for accuracy

"Accuracy that was in the realm of dreams a few years ago is now being used everyday to produce power transmission components. Up to 1940 we thought in thousandths," said John K. Morris, manager of engineering for Western Gear Corp., at Lynwood, Calif. "Now we deal in ten-thousandths, and we're reaching ahead to millionths."



John Morris, Manager of Engineering, Western Gear Corp., Lynwood, Calif., tells regional editor Scholer Bangs (right): "We're reaching ahead to millionths of inches in our metrology laboratory."

He was standing in a specially built and expensively outfitted metrology laboratory, used solely for measuring gears. These gears are made to tooth index accuracies within 5 arc seconds. Optical methods, using instruments calibrated to 1/10 second of arc, are but a part of the specially designed measuring technique.

"Gears built to this accuracy are not stock items. And they're quite costly," he told our western editor.

"But accuracy techniques developed to produce these gears will ultimately be reflected all the way down the production line. The result will be more accurate commercial gears and power transmission packages.

"In the power transmission industry, accuracy has become critical, and will become more so, in making parts for smaller and smaller gearbox packages that run at higher and higher speeds. Some experimental

gears are now running at more than 100,000 rpm. "Accuracy is also an important factor in producing quiet transmissions. Noise tolerances are already appearing in some transmission system specifications, although the engineers don't always clearly understand what is wanted or needed."

Morris pointed out that some manufacturers are going to unrealistic extremes in surface finishing precision components.

"Customer excitement creates unrealistic demands for new products in some areas," he said.

"Callouts for extreme parts accuracy may be needless. Why go to the expense of an ultra-quiet transmission when it is literally to be submerged in the high-level noise of the surrounding machinery?"

"In transmission systems, as elsewhere, there should be a practical relationship between specified tolerance requirements and actual requirements. It is possible to go overboard in specifying tolerances, and a number of manufacturers seem to be."

A special machinery designer says:

"For most products, you can rely on the manufacturers catalogs for all the design data," agrees Fred Waite, Chief Engineer of the Bakery Equipment Department, American Machine and Foundry, New York. Sometimes, though, the makers withhold vital information, that can completely upset our designs. For instance, roller chain catalogs base allowable power transmission on the breaking strength of the chain, and not on the bearing area of the pins and bushings. Because of the small projected area of these parts, the load on them is relatively high compared to the strength of the side plates.



Fred Waite, Chief Engineer of the Bakery Equipment Dept., American Machine and Foundry, New York, comments on the user-manufacturer communications problem in the power transmission field.

To obtain long life without a lot of stretching, a well lubricated chain should not be loaded above 400 psi of bearing area. A safe load for a well lubricated $\frac{5}{8}$ -in. pitch chain is only 40 lb. Manufacturers catalogs, however, allow many times this load.

"We realize that this stretching isn't a vital matter in many applications. But in our bread slicing

A LOOK AT COMPONENTS

and wrapping machines it is. We use chain to synchronize various movements, and when it stretches, it upsets the operation of the machine. Of course, you don't have to throw the chain out the minute it stretches. You can use idlers. But every time they are adjusted, the critical timing/spacing sequences have to be reset, and this is a delicate, time-consuming job.

"Maybe the answer is for the manufacturer to offer two lines of chains. One would be for ordinary power transmission, and the other for critical timing operations. This latter would be rated by bearing load, whereas the other could be rated on breaking strength.

"In the meantime, one manufacturer is redesigning the pins and bushings for AMF, on a special basis, which is some help. All our new designs will use direct drives, though, until such a chain is available for a reasonable price.

"Another thing the chain catalogs don't bother with is the tolerance on pins and bushings. They only contain nominal diameters. We never know whether we're going to get a tight fit, push fit, or a loose fit until we do a custom measuring job on each unit. Even when you call the maker, you can't always get this information."

His assistant says . . .

George Panuline, Assistant Chief Engineer of the Bakery Equipment Department, also had a word for us on the subject of the chain catalogs.



George Panuline, Asst. Chief Engineer at A.M.F.'s Bakery Equipment Dept. He asks manufacturers to publish more materials and other design information in their catalogs.

"We're very interested in the materials and design information on the chains and sprockets, too. But it's never available. For instance, we have requested data on distribution of chain pull on sprocket

teeth, and received no more than promises. We also need to know the hardness of the teeth we use, and the material that's been used to make them. You find these facts from the maker, and then—no warning—he switches material, and hardness. Naturally, he doesn't notify his customers, because the information wasn't shown in his catalogs anyway. If we try to get around this problem by specifying materials and hardnesses, then the makers charge for special purchases . . . at a higher price."

Our industry needs standards

Frank J. Wood, chief engineer for the Rolling Mills Industrial Equipment Div. of Baldwin-Lima-Hamilton Corp., Philadelphia, gave us many typical



Frank Wood, Chief Engineer, Rolling Mills Industrial Equipment Div., Baldwin-Lima-Hamilton Corp., Philadelphia. Is there planned obsolescence in Industrial Products?

comments. A short portion of our talk with him is reported here by our Eastern Editor.

"Reliability of components is not the problem it used to be, particularly with the trend to combining components into assemblies. If a component fails, the whole assembly is replaced with a new one. The bad one is shipped back to the maker for repair. However, this is costly; it would be better if there were no unscheduled downtime.

"In automatic controls, I don't see any great need for new designs, but rather considerable application engineering to combine known and existing components to do the required jobs.

"Standardization, particularly of enclosed gear units, would be a great boon. Hardly any manufacturers use the same ratings system, shaft sizes, or center distances. The situation is particularly annoying on shafts. One manufacturer comes out with a particular unit having a shaft diameter of X-in. Another manufacturer builds the same nominal size unit a couple of months later, but with a shaft diameter of $X + \frac{1}{8}$ in. for competitive reasons. Then he boasts of the greater safety factor in his unit.

"Changes in industrial products occur almost as fast as in the 'planned obsolescence' auto industry. We would like to see a trend toward standardization. Like worm gears, where manufacturers are spacing centers on even inches rather than fractions."

Our next interview takes it from here . . .

Smaller, lighter components, please

McCulloch Corp., Los Angeles, makes a variety of products driven by their own small two-cycle gas engines. For all of them McCulloch has designed specialized transmissions tailored to unusual power and load requirements.

Naturally McCulloch believes these transmissions are the best available to do the job. W. B. Burkett, chief engineer, emphasizes 'available'.

He says:

"We designed our own transmissions because we couldn't find one that could meet our concepts of small size, light weight and ability to take the continuous beating of two-cycle torque loads.

"Our engines show an average torque of from 50 to 130 inch lbs. but produce peak torques ten times higher.

"So far, we have stuck to spur gear direct drives and right-angle geared drives, manufacturing our own carburized and hardened gears for a standard 3:1 transmission ratio.

"This gives us a small, narrow package, with good balance.

"We like the idea of the centrifugal clutch, but would welcome one that might reduce clutch weight, now 1.5 lb., and even moderately reduce the slip zone for more precise engagement.

"Currently we use 3203 and 3204 size ball bearings, and some needle bearings, in our transmissions. We'd like to see bearing manufacturers offer smaller ball sizes with the same load ratings as those now commercially available.

"But what I really would like to see is flexible transmission shafting and fluid couplings, in size, weight, and cost, compatible with our peculiar needs.

"Available fluid couplings are too hot and too large. The ideal combination, if it could be produced

at reasonable cost and in a small package, would be a fluid coupling with a torque converter. It would give us a better drive with considerably less shock for two-cycle power takeoff.



W. B. Burkett, Chief Engineer, McCulloch Corp., Los Angeles, points out some of the special problems encountered by makers of lightweight gas engine-driven products.

"A light-weight, small diameter, low cost, flexible shaft would enable a man to strap a small engine on his back and give him greater flexibility in handling a driven tool, whatever it might be.

"We've looked at flexible shafts, but they're still too big and costly. One recently offered to us had 1¾ to 2 in. OD, a shaft length of 3½ ft. and cost \$20. The diameter of shaft was against it, and the price made it more costly than other ways of transmitting the power of small two-cycle engines."

Along the aisles . . .

a preview of power transmission products

1004 ACME CHAIN CORP.

Roller chains—Offset Side Bar Series, #3100, #3120, #3140 in multiple widths and #3160. Also, circular roller chain designed to operate on anywhere from 45 to 320 degree power turns. General display will show roller chains, sprockets, attachments, flexible couplings and other transmission products.

Circle 200 on Reader Service Card

213 AETNA BALL & ROLLER BEARING CO.

Bearings and bearing components—Emphasis is on roller bearings in two basic load carrying types—pure radial and pure thrust. Thrust types are fur-

nished as specials, radial types are made to order in both custom and standard designs. The standard line, interchangeable with other brands, covers four series. Certain designs have separable inner or outer races, so the assembly can be varied to suit the application.

Circle 201 on Reader Service Card

945 THE LOUIS ALLIS CO

Electric motors and adjustable speed drives—Bulletin 111 Synchro Range Drive; Liquid Cooled Magnetic Drive, with transistorized controls; Select-A-Speed—a transistorized dc adjustable speed drive; Rerated Wound Rotor Motor; Capsular—encapsulated ac motor. The Bulletin 111 Synchro Range Drive

adjusts speed of induction drive motors while keeping exact synchronization, by varying the power output. Magnetic Drives (ac power) use liquid cooled magnetic coupling, come as a complete drive package in ratings from 50 to 2500 hp. Select-A-Speed Drive, with transistor control, converts ac to adjustable dc to regulate speeds. The Wound Rotor Motor has been redesigned to NEMA standards in frames 213 through 326U.

Circle 202 on Reader Service Card

711 AMERICAN SMELTING AND REFINING CO.

Continuous cast bronze—Display demonstrates the variety of Asarcon Bronze

SHOW PRODUCT PREVIEW

shapes and alloys; available in lengths up to 20 ft. This material has excellent fatigue and other physical characteristics for bearings, bushings, gears and other transmission products. An activated diagram will show how the Asarcon continuous casting process works.

Circle 203 on Reader Service Card

210 ARGUTO OILLESS BEARING CO.

Oilless bearing material and applications—Bearings are machined or molded to shape to close tolerances. Materials

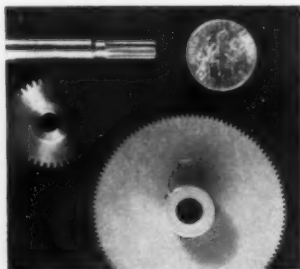


will not cold flow or melt. Material is an alloy of plastics, with a high load carrying capacity, low coefficient of friction, good heat dissipation, and a wide ambient temperature range.

Circle 204 on Reader Service Card

342 BOSTON GEAR WORKS

Complete transmission package—Featured will be 14½ and 20 degree pressure angle gears, chain and sprockets, Ratiomotors and Reductors, variable speed drives, Optimount (helical geared speed reducers) universal joints, couplings, bearings (ball and bronze). Sprockets cover 1488 types and sizes, for any chain drive ¼ to 2 in. pitch. On show for the first time is a new line of precision spur gears (below). Helical



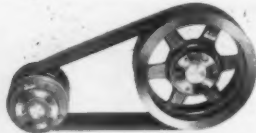
geared speed reducers for in-line drives include fractional units (¼ to ½ hp) and larger units rated up to 10 hp.

Circle 205 on Reader Service Card

251 BROWNING MFG. CO.

Variable speed drives, bearing units, gearbelt drives—The MVP Variable Speed Drive features MVP Sheaves with patented locking-ring assembly that will not work loose, concentric grooves, and

flanges that do not rotate on adjustment. Bearing units have malleable housings, include tapered roller types and the FB 900 flange block. Gearbelt drives trans-



mit power by positive engagement of belt teeth with pulley grooves, eliminating slippage.

Circle 206 on Reader Service Card

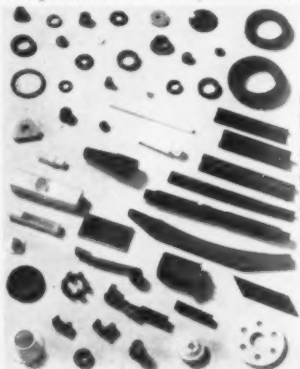
1144 CULLMAN WHEEL CO.

Roller chains and sprockets, accessories—On show will a complete line of ASA standard roller chains in both riveted and cotter pin types. Single, double, triple and quadruple widths, standard and custom attachments. Stainless steel and cable chains also available. Display will include a wide range of standard and special sprockets in a variety of configurations and materials.

Circle 207 on Reader Service Card

146 DIXON CORP.

Rulon and Teflon parts, Rulon slip lubricant—Parts to be shown include molded and machined bearings, cup packings, bushings, seals and gaskets, O-rings and piston rings, shaft seals, ball bearing retainers and many other custom



and standard parts. Rulon Spray is reinforced fluorocarbon anti-stick agent, in aerosol spray cans, suitable for belts, gaskets, gears, or chutes conveyors, etc.

Circle 208 on Reader Service Card

322 DODGE MFG. CORP.

Speed reducers, screw conveyor drives, flexible cushion couplings, etc.—A pan-shaped rubber flexing element is the new design feature of two cushion type couplings for high speed or high torque applications. In the Para-Flex High Speed coupling (for speeds to 5320 rpm), the flexible member is supported on one side by a clamp-ring flange, with its larger side bolted to a taper bushed steel disc.

The Para-Flex Flywheel type bolts directly to the flywheel of the driving engine, with sizes to fit bolt circles of most SAE flywheels, to 19¼ in. dia.

Circle 209 on Reader Service Card

DESIGN ENGINEERING

Exhibitors from the power

Company	Booth No.
Acme Chain Corp.	1004
Aetna Ball & Roller Bearing Co.	213
The Louis Allis Co.	945
Aluminum Co. of America	721
American Machine & Metals	857
American Sealants Co.	131
American Smelting & Refining Co.	711
Amplex Div., Chrysler Corp.	1142
Arguto Oilless Bearing Co.	210
The Artus Corp.	1049
Atlas Chain & Mfg. Co.	505
Bendix Corp.	955
Boston Gear Works	342
Brook Motor Corp.	1121
Browning Mfg. Co.	251
Carter Controls	1005
Century Electric Co.	921
Chicago-Allis Mfg. Corp.	154
Cleveland Graphite Bronze Div.	121
of Clevite Corp.	121
Climax Molybdenum Co.	511
Continental-Diamond Fibre Corp.	156
Crane Packing Co.	237
Cullman Wheel Co.	1144
Curtiss-Wright Corp.	1219
Marquette Div.	1206
Cycledynamics, Inc.	1206
The D.S.D. Mfg. Co.	222
Dayton Industrial Products Co.	1017
DeLaval Steam Turbine Co.	836
Diamond Chain Co.	1288
Dixon Corp.	146
Dodge Mfg. Corp.	322
Dynamic Gear Co.	134
Eaton Mfg. Co.	656
Electro Dynamic Div., General Dynamics Corp.	1112
Fawick Corp.	224
Foot Bros. Gear & Machine Corp.	444
Formasprag Co.	736
Franklin Electric Co.	1052
Garlock, Inc.	618
General Controls Co.	1024
General Electric Co.	423
Gleason Reel Corp.	1015
Tormag Products Div.	1211
Gordos Corp.	420
B. F. Goodrich Aviation Div.	960
Graham Transmissions, Inc.	105
Greene, Tweed & Co.	1143
Gries Reproducer Corp.	512
The Hanson Mfg. Co.	109
Hart Reduction Pulley Co.	1205
Hartford Steel Ball Co.	853
Haydon Div., General Time Corp.	1120
The Hilliard Corp.	1062
Hoover Ball & Bearing Co.	920
E. F. Houghton & Co.	844
Illinois Tool Works, Spiroid Div.	1000
Industrial Tectonics, Inc.	101
Janette Electric Mfg. Co.	1012
Johnson Bronze Co.	137
The Kaydon Engineering Corp.	116
Laminated Shim Co.	

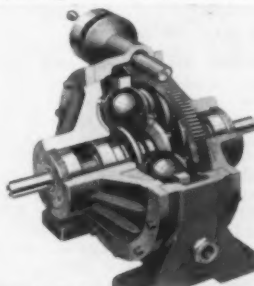
SHOW

transmission field

Company	Booth No.
Landis & Gyr, Inc.	1160
Lear Inc., Instrument Div.	1013
Lehigh Chemical Co.	1253
Lignum-Vitae Products Corp.	144
Link-Belt Co.	743
Lord Mfg. Co.	912
Lovejoy Flexible Coupling Co.	1044
Manheim Mfg. & Belting Co.	1241
Marlin-Rockwell Corp.	1212
The Masland Dura-leather Co.	944
Maurey Mfg. Corp.	346
McGill Mfg. Co.	1031
Mechanical Products, Inc.	1155
Minneapolis Honeywell	
Regulator Co.	1246
Morse Chain Co.	842
Mueller Brass Co.	701
New Departure Div.,	
General Motors Corp.	118
Nice Ball Bearing Co.	1060
The Ohio Gear Co.	1136
Orange Roller Bearing Co.	1020
Owatonna Tool Co.	1203
P.I.C. Design Corp.	340
The Polymer Corp.	1105
POWER TRANSMISSION DESIGN	1253
Randall Graphite Bearings, Inc.	1016
Raybestos-Manhattan	918
Reliance Electric & Engineering Co.	744
Robbins & Meyers, Inc.	1149
Robertshaw Fulton Controls Corp.	223
Roller Bearing Co. of America	362
Rollway Bearing Co., Inc.	117
SKF Industries, Inc.	419
Saginaw Steering Gear Div.	
General Motors Corp.	845
Sier-Bath Gear & Pump Co.	958
Sigmamotor Inc.	1233
Simplatrol Products Corp.	1161
The Snow-Nabstedt Gear Corp.	1039
Sterling Precision Corp.	1001
Stow Mfg. Co.	150
Tann Corp.	924
Thomas Flexible Coupling Co.	943
Thomson Industries, Inc.	962
Unitech Corp.	1127
United Shoe Machinery Corp.	400
U.S. Electrical Motors Inc.	508
United States Rubber Co.	762
Veeder-Root Inc.	243
Vickers, Inc.	549
Waldes-Kohinoor Inc.	1018
Waldron Hartig Div.,	
Midland Ross Corp.	327
Warner Automotive Div.,	
Borg-Warner Corp.	501
Warner Electric Brake & Clutch Co.	700
Web Controls Corp.	247
Westinghouse Electric Corp.	356
The S. S. White Dental Mfg. Co.	916
Winsmith, Inc.	1244
T. B. Wood's Sons Co.	901
Worthington Corp.	308

656, 660, 662, EATON MFG. CO. CLEVELAND WORM & GEAR DIV.

Worm gear speed reducers, variable speed drive—Fan-cooled worm gear reducers in a new vertical construction cover 9 sizes ranging from 3 in. to 12. center distances. Ratios extend from 4 1/7:1 to 95:1; ratings are fractional to 175 hp.

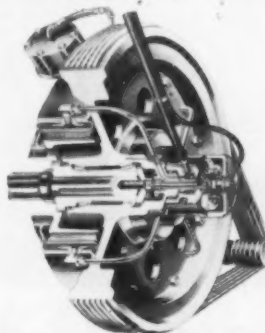


Cleveland Speed Variator gives output speeds with 9:1 and 6:1 ranges, is available from 1/3 to 15 hp. Motors are radial air gap design to NEMA "B" specifications. Power is transmitted through input shaft to a bevel drive disc in contact with axle-mounted alloy steel drive balls. Input shaft rotation causes balls to rotate about their axes, which transmits power to the output shaft by a similar ball-disc contact.

Circle 210 on Reader Service Card

224 FAWICK AIRFLEX DIV., FAWICK CORP.

Clutches and brakes, magnetic clutches and brakes—Models on view will include the LC Brake, the miniature FSPA, the FSPA, the 6 CS Brake and the 8CB Brake, SP and SC magnetic clutches and the SA and SB magnetic brakes.



The miniature FSPA (Fawick Standardized Press Application) is a pneumatic clutch and brake package application for bench presses for low-tonnage ranges. It has a 6-in. diam. drum-type air clutch and a 4 in. diam. self-energizing brake. The package is designed for high speed cyclic machines requiring extremely accurate starts and stops. Clutch portion of the package may be pulley-mounted.

Circle 211 on Reader Service Card

736 FORMSPRAG CO.

Sprag-type clutches—New series to be shown will be the HPI (high performance indexing) for rates up to 1200 strokes per minute, in bore diameters from .500

in. to 6.000 in. and torque capacities from 140 lb-ft to 13,500 lb-ft; the HPO (Hi-Performance Over-Running) for use as high speed backstops on gear reducers, in bore diameters from .500 in. to 6.000 in. and capacities from 150 lb-ft to 13,500 lb-ft; the HBS (Hi-Speed Backstop) which is an HPO with an oil reservoir and a sight gage, with bore diameters from .500 in. to 2.750 in., capacities from 150 lb-ft to 1900 lb-ft; and the HB (Holdback) which prevents reverse rotation, and is available in bore sizes from 2 in. to 12 in., with ratings from 1200 lb-ft to 136,500 lb-ft.

Also on show will be the Rev-Lok, a compact torque locking and positioning device which drives, positions, over-runs and backstops in two directions, but stops torque feedback from either.

Circle 212 on Reader Service Card

1052, 1056 FRANKLIN ELECTRIC CO., INC.

Standard integral, fractional submersible electric motors; fractional hp gear motor—Special feature will be a new line of standard integral hp motors of aluminum construction, said to be 30% lighter, yet structurally stronger than cast iron motors on a rating-for-rating basis.



Other design points include a special bearing system that excludes contaminants and prevents under or over greasing; and a quick disconnect terminal board for simplified voltage changeover. Single and polyphase types, 1-7 1/2 hp, 182-184, 213-215 frames, totally enclosed or drip-proof construction, foot-, flange-, or resilient mounted.

Also on view for the first time—a parallel shaft, totally enclosed fractional hp gear motor (above) for milk coolers and similar jobs. Smooth exterior, adhesive nameplate, stainless steel shaft extension, wipe-on gear lubricant. Speeds of 30, 33, 36, 60, 66, and 72 rpm using single and two-speed motors.

Circle 213 on Reader Service Card

618 GARLOCK, INC.

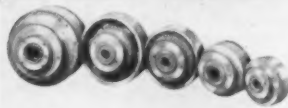
Seals, bearing plastics, bearing retainers—New development in the oil seal line is the P/S (positive seal) Klorure Oil Seal, with a filled Teflon sealing element. These seals will not wear or score the shaft, and will seal at speeds to 3000 fpm. Construction shows a steel shell which encloses and positions all components, a special gasket to hold the sealing element and the filled Teflon element itself which rides against the shaft, keeping lubrication in and dirt out.

Circle 214 on Reader Service Card
continued on next page

SHOW PRODUCT PREVIEW

109 HART REDUCTION PULLEY CO.

Reduction pulleys and accessories—On display will be several new reduction pulley designs for two and three-speed adaptation. These include diameters from 10 in. to 40 in. for internal gear reductions from 1:999 to 1457:1; and for special types up to 8000:1 reductions. Gears



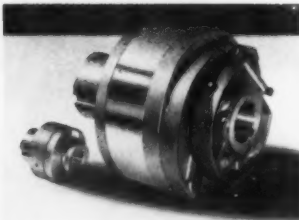
are inside the pulley, need little more space than an ordinary pulley.

Company will also show a new design in post brakes for use on their pulley and other accessories such as disc clutches, overload releases, optional flat, V-belt, timing belt, gear or chain drives.

Circle 215 on Reader Service Card

1120 THE HILLIARD CORP.

Clutches, drives, couplings—These include the IDU package drive unit, the single revolution clutch (Types 4, 6, and fractional hp), the over-running clutch and coupling (Types 1, 3, 8, 83, 95, 96, 98), the slip clutch and slip coupling, and the Twiflex combined flexible coupling and centrifugal clutch.



New this year is an intermittent motion control package, consisting of a single revolution type clutch with related controls. This series will have capacities up to 250 ft-lb and speeds from 50 to 250 and/or 300 rpm. Maximum bore diameter will be approx. 1-3/16 in.

Circle 216 on Reader Service Card

743 LINK-BELT CO.

Variable speed drives, chains, bearings, couplings etc.—Emphasis in a display of a complete line of power transmission equipment will be on the new RS P.I.V. (positive infinitely variable) drive with ratings up to 50 hp and other P.I.V. units. Typical enclosed gear drives will be displayed.

The self-aligning bearing line will be represented in a number of sizes, including new spherical roller bearings, ball bearings, pillow blocks and flange units.

Circle 217 on Reader Service Card

1044 LOVEJOY FLEXIBLE COUPLING

Flexible couplings, universal joints, variable speed belts, pulleys—A new line of universal joints for applications to 1500 rpm is available with both single and double joints in a wide range of

sizes. Single joints operate through a full working angle of 40 degrees and double joints through 80 degrees. Rated at .35 to 190 hp, in sizes from 3/8 to 4 in. (Square bores if needed). Construction is case hardened steel, with some sizes in various grades of stainless and also with bronze bushings around the pins.

Circle 218 on Reader Service Card

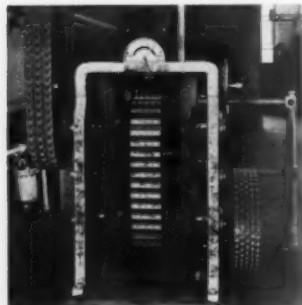
346 MAUREY MFG. CO.

Multiple belt drives and sheaves, grooved belt and pulley drives conveyor drives—The Super-Wedge Drive and the Maurey Positive Drive will be on display. New this year is the Maurey Flat-Veyor belt, in either stainless or standard steel. The steel plates with flat carrying surfaces are linked chain-wise by locking pins inserted through embossed shoulders on the undersides which serve as combination hinge and bearing. These shoulders act as cogs, meshing with the grooves of the steel pulleys. Belts are easily adapted to any required center distance by installing or removing the interlocking plates. Available in widths of 3 3/4 to 7 1/2 in. for both standard or stainless.

Circle 219 on Reader Service Card

1241 MANHEIM MFG. & BELTING CO.

Link V-belts, variable speed belts—Featured will be a demonstration showing the difference between the Veelos and MVS Belts and regular endless V-belts, on a vibration analyzer. The MVS uses cup washers and T-screws to join uniform links together, is available in 26 widths from 1 1/2 through 5 in. Can be adjusted to any length. The link-construction Veelos V-belt comes in regular, oil-proof, coated and static conducting



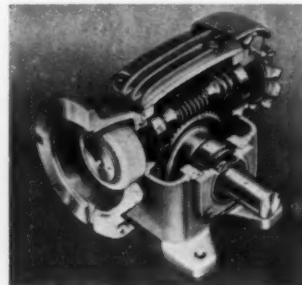
types, in all standard widths, packaged in 100 ft lengths on reels. It is said to reduce vibration up to 90% and to need 1/10 of the usual time to install V-belts.

Circle 220 on Reader Service Card

1136 OHIO GEAR CO.

Worm gear reducers, stock gears—Highlight will be the new Hi-Line series of fin and fan cooled single-reduction worm gear reducers in more than 100 types and sizes. Three basic models—worm above, worm below, and vertical right angle drive, with center distances from 1.33 in. to 5.25 in. Ratios range from 5:1 through 60:1. Models with motor mounting flanges accommodate standard NEMA motors, with either direct

or flexible couplings. Fin and fan cooling increases thermal capacity ratings and reduces unit size.



Stock gears to be shown include interchangeable 14 1/2° and 20° P.A. types.

Circle 221 on Reader Service Card

1020 ORANGE ROLLER BEARING CO., INC.

Bearings—Will display a complete line of needle bearings (full type and cage type), staggered roller bearings, journal



roller bearings, cam followers, cam yoke rollers, thrust roller bearings and many adaptations of roller bearings for special purposes.

Circle 222 on Reader Service Card

1105, 1107 THE POLYMER CORP.

Industrial plastics—Stock shapes and fabricated parts in Poypenco nylon, Nylatron GS molybdenum disulphide, Teflon, TFE fluorocarbon, Fluorosint TFE, Polycarbonate and Nylasint. Also on show will be Nylaflo nylon braided pressure hose, in sizes up to 1 in. and burst pressure ratings to 12000 psi; and Corvel plastic coatings for application to metals in the fluidized bed coating process. Of particular interest is MC Nylon—available in larger rod, plate and tubular bar than any other commercial nylon, for rollers, bearings, wear plates and gears; and Nylasint pressed and sintered nylon components with permanent built-in lubrication for bearings, etc.

Circle 223 on Reader Service Card

918 RAYBESTOS-MANHATTAN INC.

V-belts, belt drives—Featured will be the Poly-V "J" Drive, which uses a parallel V-ribbed belt which runs in sheaves grooved to mate with the belt ribs. The "J" Model was designed for small diameter sheaves and pulleys (as small as 3/4 in. dia.) and short centers, and high

rpm and belt speeds (10,000 fpm). With high contact area and low unit face pressure, plastic and diecast sheaves can be used with no loss of dependability.

Circle 224 on Reader Service Card

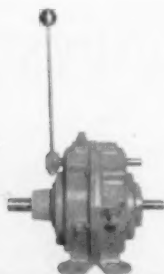
958 SIER BATH GEAR & PUMP CO.

Flexible gear couplings, screw and gear pumps, precision gears—New product on show will be a lubrication seal for Sier-Bath flexible gear couplings consisting of two separate heat treated steel washers bonded together one inside the other by a flexible hinge of Buna-N. The inner washer provides a press fit on the coupling hub, and the outer washer fits in the seal cavity cut in the coupling sleeve. The Buna-N hinge permits the washers to maintain press fit at $1\frac{1}{2}^\circ$ misalignment and speeds over 5000 rpm. Washers also prevent damage to the seal by hub teeth.

Circle 225 on Reader Service Card

1039 SNOW-NABSTEDT GEAR CORP.

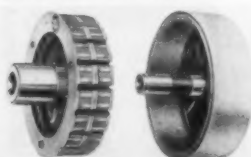
Transmissions, speed reducers and increasers—Featured will be five models of a small reversing transmission—planetary in-line type, with one or two speeds in forward, a neutral, a reverse and a built-in reduction. Operator can shift under full load and speed with a single lever. Four models have maximum input speed of 2400 and limitations of 8 and 24 hp. Single speed units have reduction in both directions of about 3:1. The two 2-speed transmissions have about 2:1 and 3:1 reduction in the forward, and 3:1 in reverse.



Also displayed will be the new 5101 single speed transmission, with a capacity of 8 hp at 3600 rpm, and 2.47:1 reduction in both directions; and the SN 4000 series speed increasers, input capacities from 2 to 2000 hp at speeds of 1200 to 3600 rpm for output speeds of over 80,000 rpm.

Circle 226 on Reader Service Card

1015 TORMAG PRODUCTS, GLEASON REEL CORP.



Magnetic drives—The Gleason Tormag Magnetic Drive is a permanent magnet eddy-current device which provides

torque control against sudden acceleration, shock and load limitations. Simplified maintenance and operation since it uses no fluid, shot, friction components or dc. Developed torque is dependent on slip (relative speed) of the two rotors, so the drive may be used on variable or lower speed applications.

Circle 227 on Reader Service Card

508 U.S. ELECTRICAL MOTORS

Gear motors, controlled speed systems—On show will be Syncrogear right angle worm gear motors, the Varidrive motor and the Varidyn speed control system, which consists of motor, alternator and automatic exciter, packaged as one power unit. This unit controls the frequency of the current supplied to the motor circuits, so it can control singly or together, many different types of ac motors. It offers a wide selection of controls (automatic, dial, pushbutton, etc) and effects (inching, simultaneous, start and stop etc). Information on numerous systems of automatic speed control for specific industrial applications will be available.

Circle 228 on Reader Service Card

POWER TRANSMISSION DESIGN

Be sure to visit us at

Booth No. 1253

A real live editor will be on show each day. He will be glad to discuss your power transmission problems with you.

549 VICKERS INC.

Industrial hydraulic power and control equipment—Among other products to be shown for the first time is a 4 hp variable speed hydraulic drive, the first in a series of transmissions with unusual installation flexibility. The hydraulic motor can be mounted in three different positions on either side of the hydraulic pump (total of 6 positions) and the foot mounting can be rotated 180° . Speed and direction of the hydraulic motor are controlled by varying the pump displacement with either a handwheel, mechanical lever or remote electrical control. Close coupling of the integral electric motor and hydraulic pump provides compact package and assures accurate alignment. Shrouded cooling fan. No-load maximum speed is 1800 rpm.

Circle 229 on Reader Service Card

501 WARNER AUTOMOTIVE DIV., BORG-WARNER CORP.

Small vehicle differential, gear boxes—The WA-79 Differential, for small vehicles up to 10 hp, is rated at 1500 in.-lb for slow moving vehicles, and 3000 in.-lb for faster ones. It has provision for

mounting sprocket, pulley or gears, and hubs for anti friction bearings. Hardened alloy steel differential gears and pinions have automotive-type cut teeth. Axle shafts can be machined to specifications.

Circle 230 on Reader Service Card

901 T. B. WOOD'S SONS CO.

Flexible couplings, V-belt drives, variable speed drives—Two of the featured product lines will be the MS Motion Control Variable Speed Drive and Sure-Flex Couplings. MS Drives incor-

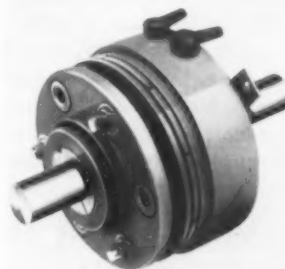


porate the MS sheave, which transmits power from the stationary flange through a sleeve cap connected to the moving flange by a series of torsionally resilient keys outside the bearing surfaces. The resilient keys assure the continuous rotational oil pumping action of the flange hub on the sleeve resulting in an evenly distributed oil film on bearing surfaces. Thus, no fretting corrosion, freezing or sticking.

Circle 231 on Reader Service Card

1246 WARNER ELECTRIC CO.

Electric brakes, clutches, splined armature drive components—New since last year is the SF 500 clutch, 5 in. in diameter, which has a ball bearing-mounted field and a torque rating of 50 ft.-lb. Comes in a variety of bore sizes, offers easier mounting, increased torque-for-size, as well as eliminating slip rings and brushholder.

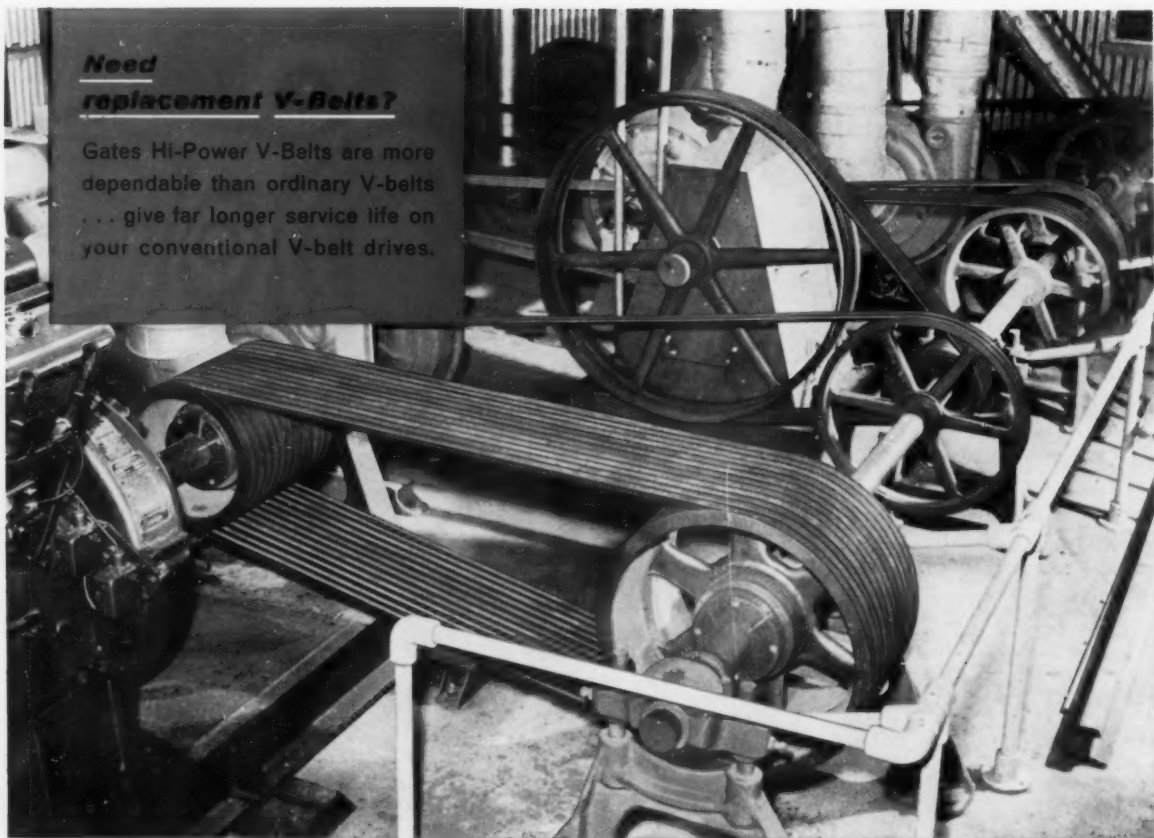


A second featured product is the Electro-Drive, new fractional hp clutch-brake package. Design uses standard Warner clutch and brake parts, with input and output shaft extensions. Available in torque ratings of 8, 60, and 240 in.-lb, the package may be interposed in drive system by direct coupling to both input and output.

Circle 232 on Reader Service Card

**Need
replacement V-Belts?**

Gates Hi-Power V-Belts are more dependable than ordinary V-belts . . . give far longer service life on your conventional V-belt drives.



Why Gates Hi-Power V-Belts are industry's No. 1 choice for replacement belts

There are several important reasons why Gates Hi-Power V-Belts are preferred by most industrial V-belt users today.

The exclusive construction features of Gates Hi-Power V-Belts—Concave Sides (U.S. Pat. No. 1813698), Precisely-Engineered Arched Top, Flex-Bonded Tensile Member—make them more dependable than ordinary, conventional V-belts, giving you far longer belt life on even the toughest applications.

Moreover, because of Gates high standards of quality control, you get a perfectly matched set of Hi-Power V-Belts every time—every belt pulls its

share of the load throughout the long service of the drive, further increasing belt life.

You get fast delivery from local stocks.

Gates Distributors, located in all parts of the country, have large stocks of Hi-Power V-Belts on hand, backed by Gates Service Centers in every major industrial area. This means that you can get replacement V-belts quickly, day or night—reducing to a minimum costly production down-time.

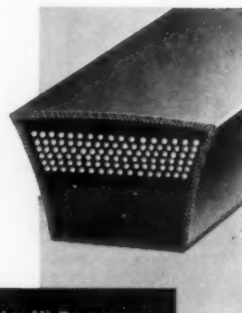
The Gates Distributor near you is a dependable source of supply for most of your maintenance needs. Call him for fast delivery of Gates Hi-Power V-Belts.

The Gates Rubber Company, Denver, Colorado

BP 40

Gates Hi-Power V-Belts

Circle 31 on Reader Service Card



Gates Hi-Power V-Belts are quickly available everywhere



Building the future on 50 years of progress

Gates

DESIGNER'S DRIVE COMPONENTS VALUE CHECK LIST

PROFIT POTENTIAL

1. Is the product's market growing?
2. Is there little competition with the product?
3. Will the company need greater plant and manpower facilities to manufacture the product?
4. Does the product enable the company to enter a new market?
5. Will the company offer drive component replacements?
6. Is a close match of horsepower and/or torque required?
7. Is the drive component system more than 20% of the product cost?
8. Are drive component extras (flanges, brakes, etc.) ordinarily provided for the design, justified?

YES NO

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MARKET APPEAL

1. Will the product sell in a special market?
2. In selecting the drive component, can I provide benefits customers will pay for?
3. Is space a top design consideration?
4. Is drive component flexibility (speed changes, remote control, etc.) a top design consideration?
5. Is easy replacement of the drive component a top design consideration?
6. Will the design life of the drive component be less than that of the product?
7. Will the product use the company's engineering and manufacturing talent?
8. Will competitors have difficulty in matching the product?

YES NO

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Grand total yes ☐

SCORING SUMMARY

12-16—Certain that added values in drive component can be obtained.

7-11—Good chance for added values in drive component.

3-6—Some possibility for added values in drive component.

1-2—Little possibility for added values in drive component.

Add Value to Design

• By **CARL W. SEYBOLDT**, Specialist, Production Planning, General Electric Co., Paterson, N. J.

DOES YOUR PRODUCT provide maximum value to customers at a minimum cost?

Evaluating the drive component's contribution to the design value will provide an almost infallible indication of whether your product will be:

- Highly successful, or
- Just another mediocre entry in the market.

Too often, we fail to take full advantage of today's drive components as contributors to design value. This, more often than not, is due to our belief that we have all the facts, and need no help. Such assumptions may well be the foundations for a "Great Wall of China" that will doom us to product mediocrity. A full consideration of the drive

components, and a few minutes of our time, can save us from such risks, and gain for us a competitive lead.

Sales and Profits go hand in hand

There are two basic, inseparable, ingredients in any product design. They are profit potential, and market appeal. Naturally, profits cannot exist without sales, and on the other hand, sales—at least growing sales—cannot be realized unless there are profits to reinvest in better tools and greater production facilities.

Sales—profits—more sales—more profits: one cannot exist for long without the other. Your products

must contain a balance of these ingredients. For instance, a product designed for maximum profit margin may have no more value for the customer than those already on the market. Result: absolutely no sales.

A Check List—And Good Judgement

You can determine the importance of drive components in product designs quickly and easily. A check list has been developed and divided into the two broad categories, profit potential and market appeal. A few minutes spent evaluating the importance of the drive components will indicate the value that can be added to the design. It will also provide a guide for the time and effort you should spend in integrating the components into a design.

Naturally, the check list is not a substitute for good judgement. But with the check list, plus good judgement, you are in a position to take advantage

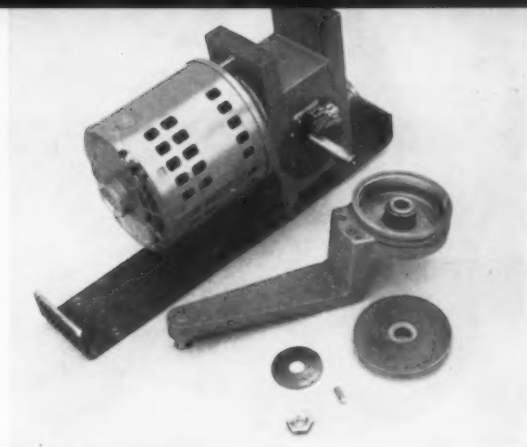
of any and all values to be gained from the drive components. It is important to remember that optimum application of drive components is a highly specialized technique. The manufacturer is a specialist in recommending and adapting the right component for your product. But he cannot adapt your product to his component.

With this in mind, we proceed to the check list. A list of 8 questions under each heading, profit potential and market appeal, is arranged to require mere yes or no answers. The greater the number of yes answers, the greater the opportunities for adding value to the product design with drive components.

A Case History

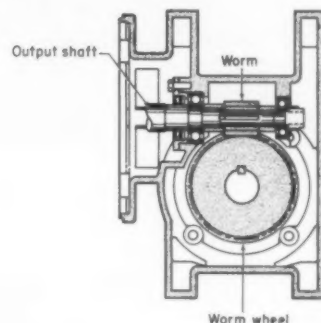
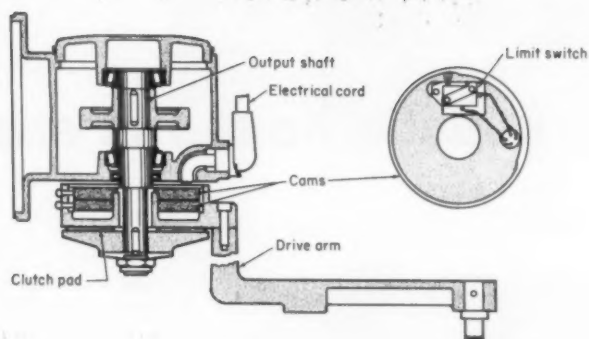
A recent new product was value-analyzed, and serves to illustrate the technique. An all-electric door-

PROFIT POTENTIAL	YES	NO	MARKET APPEAL	YES	NO
1. Is the product's market growing?	✓ The market is growing at least as fast as the population because principal customers are stores, restaurants, hotels, etc.		1. Will the product sell in a special market?	✓ The automatic door opener market is specialized, requiring a versatile product.	
2. Is there little competition with my product?	✓ There are about ten door opener makers, only a few of whom make electric door operators.		2. In selecting the drive component, can I provide benefits customers will pay for?	✓ All-electric drive package can provide increased dependability, and lower maintenance.	
3. Will the company need greater plant and manpower facilities to manufacture the product?	✓ With the sales we should make, we will require an increase in plant and manpower facilities.		3. Is space a top design consideration?		✓ Not as important as trouble-free operation and low maintenance.
4. Does the product enable the company to enter a new market?	✓ Since we are a relatively new company, and because this is an all-electric operator as opposed to the prevalent hydraulic and pneumatic systems.		4. Is drive component flexibility (speed changes, remote control, etc.) a top design consideration?	✓ Remote control from foot operated switch mats is necessary and reversal and timed running cycles of the drive.	
5. Will the company offer drive component replacements?	✓ To be certain that correct drive components are used.		5. Is easy replacement of the drive component a top design consideration?		✓ Not as important as being able to operate the door manually, but it must be accessible for inspection.
6. Is a close match of horsepower and/or torque required?		✓ Not so much as dependability. We will certainly not over-power the application, however.	6. Will the design life of the drive component be less than that of the product?		✓ Since the drive component is such a large portion of the total product, it's life should equal the product life.
7. Is the drive component system more than 20% of the product cost?	✓ At the price we expect to sell the door operator, the drive component system might approach 30 per cent of the total cost.		7. Will the product use the company's engineering and manufacturing talent?	✓ Unique design of the system is apparent and will require creative manufacturing techniques to maintain high quality, volume production.	
8. Are drive component extras (flanges, brakes, etc.) ordinarily provided for the design justified?	✓ Mounting clutch, cams and switches can better be provided by the drive manufacturer since he is experienced in adapting them to suit his drive for many applications.		8. Will competitors have difficulty in matching the product?	✓ The system incorporates all-electric features not found in other designs. They require considerable prototype and field testing.	



GEAR MOTOR, clutches cams and microswitches act to power the door both on closing and opening.

ANY PRODUCT MAY BENEFIT from a value analysis. The door opener, being of an entirely new design, showed exceptional benefits, for both maker and customers.



VALUE ANALYSIS is no magic wand that can be waved over a product to make it profitable. It is part of the design engi-

neers job—a part which has too often been neglected in the past. Many companies now use Value Analysis Engineers.

opener built by the Hopkins Electric Door Opener Company, Philadelphia, consists of a drive component, a control panel, and a switch.

The drive component incorporates a gear motor, clutch assembly, driving arm, actuating cams, and microswitches. The door is power-opened, and power-closed, and must be holdable in any position in case an obstacle blocks the entrance. When the obstacle is removed, the door must continue opening, or closing.

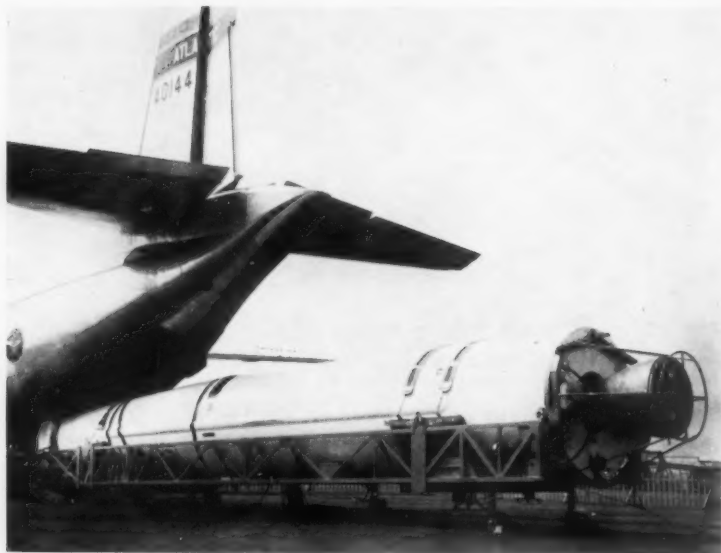
The check list opposite shows that the designer should definitely consult with drive component manufacturers for all aspects of these added value contributions. In the case of the Hopkins door opener design, this was done. Drive component and control recommendations resulted in the highly specialized, tailor-made components. Hopkins Co. worked with their supplier, General Electric Co., through the prototype, field and production stages, to market an all-electric door operator system with added values.

There is a need for added value in all products. Often the added values can come from the drive components of the product. The check list helps

the design engineer determine how much contributions can come from drive components. Using the check list actively, the design engineer may find ways to incorporate many of the drive values introduced in the past ten years—some of which he may not know even exist. He should take full advantage of:

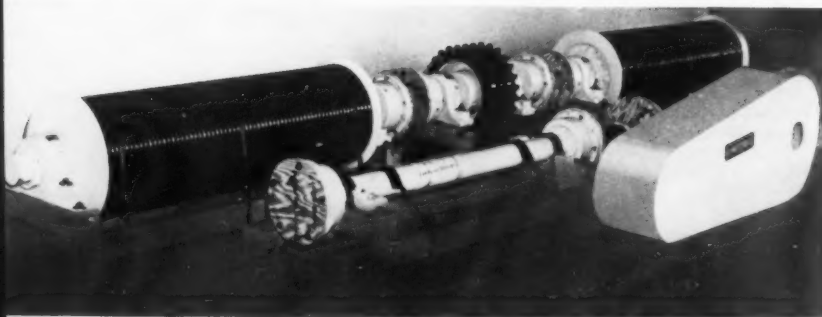
- Improved overload protection.
- Higher gear efficiencies.
- Higher operating temperatures.
- Variety of adjustable speed drives (both electrical and mechanical).
- Universal mountings
- Remote controls (electric, mechanical, pneumatic, hydraulic).

These are just a few of the advances in drive components available, if he will only call on the manufacturers for their specialized skills in applying them. The next decade will find new frontiers opened in technological breakthroughs which dwarf those made in the past ten years. We must take full advantage of the possible contributions from drive components to add value in our products now. ♦



THE MISSILE IS LOADED on a Douglas C-133 military transport for delivery to any part of the world. The plane can ship entire missile shelter and equipment for a complete launching pad.

Moving missile house is easy



THE LINK-BELT DRIVE UNIT for the missile shelter comes in five subassemblies. They can be quickly assembled at the launching site. Each cable drum is 26 ft. in length.

THE MISSILE SHELTER is retracted 100 ft on rails. The Link-Belt driving equipment for this purpose also holds the shelter against high winds.



EACH LAUNCHING PAD for the Thor missile has a shelter. When in operation, the shelter is retracted 100 ft along rails, allowing the Thor to be erected ready for firing.

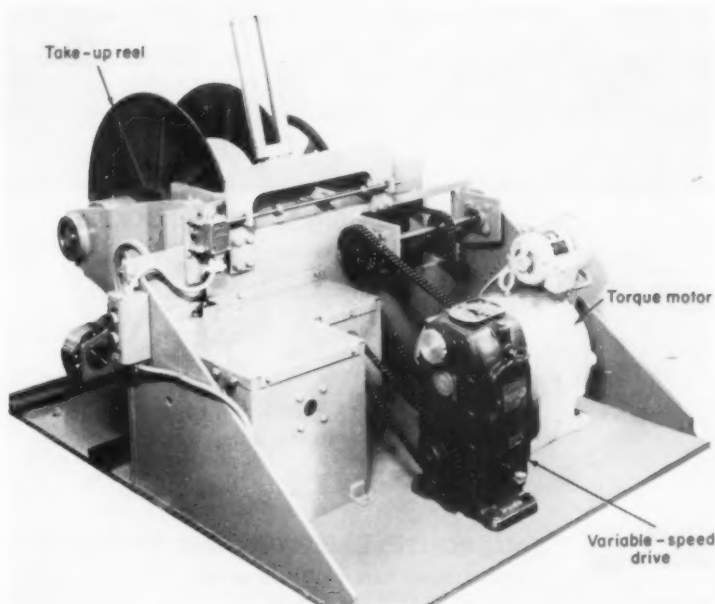
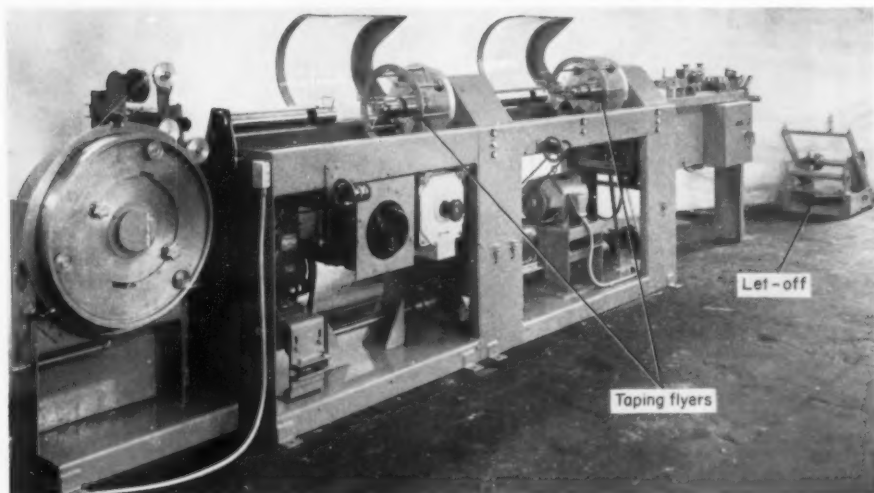
The total drive assembly for moving the shelter is furnished by Link-Belt Co. A long steel cable is anchored in the ground at both ends of the rail travel. The cable goes in one end of the missile shelter, wraps around a cast steel drum, then passes out the other end. To provide proof-positive action in case of breakdown, there are two sets of cables and drums, both ready for action. The drive assembly is also used as an anchor in high winds.

The total assembly consists of RC quadruple-width roller chain and sprockets, self-aligning roller bearing pillow blocks, SG geared flexible couplings, heat-treated cast steel cable drums and heat-treated shafting. The drive mounts on the underside of a fabricated carriage.

The whole missile shelter is portable. Missile, shelter, and driving equipment are flown as a packaged unit in a Douglas C-133 military transport and assembled on rails at a launching site. ♦

Motor-generator times wire-wrapper

LET-OFF, flyers and take-up must be synchronized for efficient control of insulating thickness. The machine is built of sections, and can be equipped with up to four flyer stations without changing the original frame.



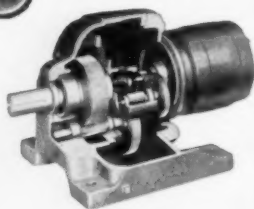
AN INSULATING MACHINE covers wire with up to eight paper insulating tapes. It is driven through a motor-generator set by a 5 hp dc motor. The main shaft drives the capstan through a variable-speed control. In this way, flyer speed can be controlled from 0—1750 rpm, in perfect synchronization with the capstan.

Wire is pulled through the machine by the takeup reel, which has a traversing arrangement so that the wire is always running in a straight line from capstan

to reel. The takeup will accept up to 30 in. reels. It is torque-motor driven.

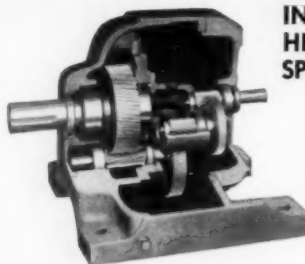
When replacing reels, the drive components do not have to be disengaged, because the reel support is shaftless. It is connected with the traverse motion through an adjustable speed drive, which permits traverse rate adjustment.

Manufacturer: American Insulating Machinery Co., Philadelphia. ♦



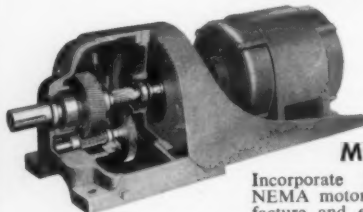
GEARMOTORS

—the ultimate in compactness—maintain positive alignment with flange-mounted NEMA motors. Double, triple and quadruple reductions, sizes up to 100 hp, speeds from 280 down to 1.8 rpm. Send for Book 2747.



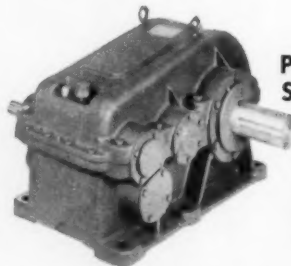
IN-LINE HELICAL GEAR SPEED REDUCERS

Let you mount the motor where you want it. Save space with input and output shafts located on same planes. Ratios 6.2:1 to 2217:1, capacities to 206 hp. Send for Book 2751.



MOTOGEARS

Incorporate bracket-mounted NEMA motors of any manufacture and enclosure, permit quick, simple motor replacement. Double, triple and quadruple reductions. Sizes up to 100 hp, ratios from 6.2:1 to 985:1. Send for Book 2747.



PARALLEL SHAFT SPEED REDUCERS

For high-capacity speed reducing or increasing with heavy shock loads. Ratios to 292:1, up to 2800 hp. Send for Book 2719.

Whatever you need in power transmission ...

complete

CHAINS AND SPROCKETS



SILENT CHAIN DRIVES — Ideal for large or small hp, large ratios, high speed and limited space. Maintain better than 98% efficiency. Stock sizes up to 50 hp. Ask for Book 2425.

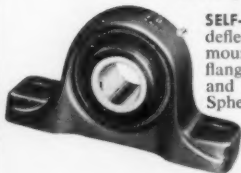


MALLEABLE IRON, PROMAL, STEEL CHAINS — Complete line of cast, combination, forged and fabricated chains plus matching sprockets. Stock sizes. See Book 1050.

PRECISION STEEL ROLLER CHAINS — For drives and conveyors, available in single or multiple widths, in ¼" to 3" pitch and 1" to 3" double pitch. Stock sizes up to 75 hp. Send for Book 2657.



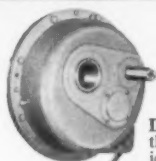
BALL, ROLLER, BABBITTED AND BRONZE BEARINGS



SELF-ALIGNING BALL AND SPHERICAL ROLLER BEARINGS adjust to shaft deflection or misalignment, compensate for normal inaccuracies of mounting. In popular shaft sizes up to 11"—pillow blocks, flanged, flanged-cartridge, cartridge and takeup blocks. Also available in cast and pressed steel housings. Send for Ball Bearing Book 2550 and Spherical Roller Bearing Book 2760.

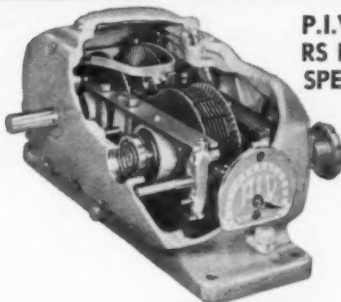


BABBITTED AND BRONZE BEARINGS — Pillow blocks and flanged blocks in 17 rigid and self-aligning types, solid or split housings, shaft sizes from ½" to 12". Send for Books 2707 and 2823.



SHAFT-MOUNTED SPEED REDUCERS

Designed to simplify and satisfy the majority of speed reduction jobs. Made in double and triple reductions up to 40 hp. Send for Book 2618.



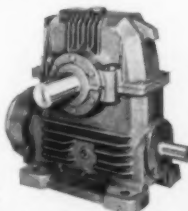
P.I.V. and RS P.I.V. SPEED DRIVES

Stepless, instant variation through a complete range of speeds. 21 types, 9 sizes from 1/2 to 50 hp and ratios up to 6:1. Send for P.I.V. Book 2274; RS P.I.V. Book 2874.



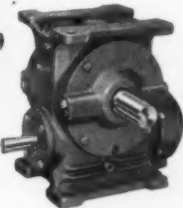
WORM GEAR SPEED REDUCERS

—for high-ratio speed reduction with right-angle takeoff. Made with single, double or helical worm gear combinations, ratios 3600:1; torque ratings to 135,000 pound inches, up to 150 hp. Send for Book 2824.



UNIVERSAL WORM GEAR SPEED REDUCERS

offer 3-way mounting flexibility. Available in 2 1/2-, 3-, 3 1/2-, and 4-in. centers. Sizes up to 13.5 hp, ratios from 5 1/2:1 to 6:1. Book 2724.

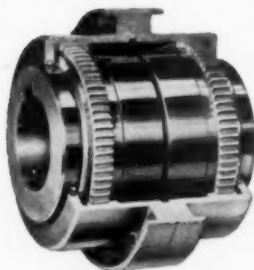


FLUID DRIVES

Offer smooth powerful acceleration and operation . . . start heavy loads without excessive power demands . . . protect operating equipment. Available in Fluid, Fluid Gear, Electrofluid Gearmotor and Electrofluid Motogear combinations in single, double, triple and quadruple reductions from 6.2:1 to 985:1 and capacities up to 50 hp. Send for Book 2747.

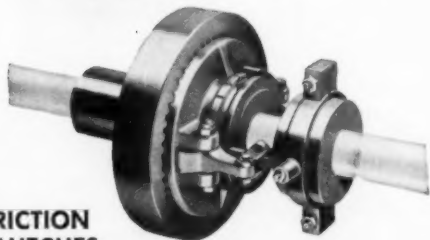
LINK-BELT's complete line gives you

flexibility



COUPLINGS

Flexible, rigid, compression, geared, geared motor, fluid and jaw-clutch types available in shaft sizes from 7/16" up to 12", for light or heavy loads, low or high speeds. Send for RC Flexible Coupling Book 2363; Geared Coupling Book 2775; Geared Motor Coupling Book 2975; All types, Book 1050.



FRICTION CLUTCHES

New design, especially suited where smooth, gradual pickup is a requisite. Available in 3 types with capacities up to 170 hp. Send for Book 2637-A.

FULL FLEXIBILITY is yours when you rely on Link-Belt. Whether you need a single component or a completely engineered drive, Link-Belt can fit your design requirements to a "T."

Link-Belt standards of quality are built into every component—service-proved designs offering longer life . . . efficiency that means *lower-costs*. What's more, pre-integrated designs assure correct mating of all components for smooth-working efficiency—with no elements under- or over-rated.

For complete information and literature, call your nearest Link-Belt office or authorized stock-carrying distributor.

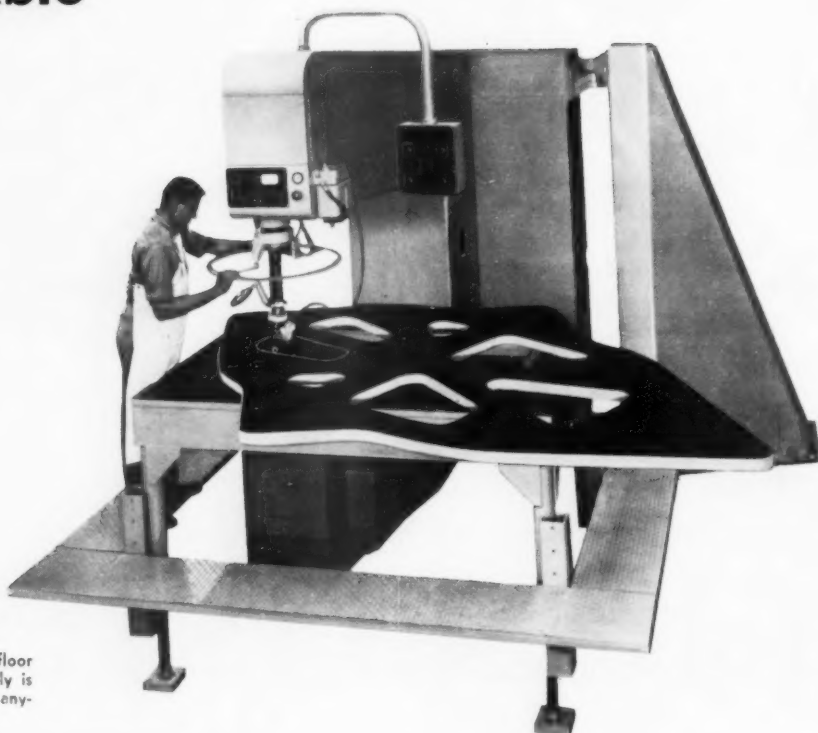
OTHER LINK-BELT PRODUCTS INCLUDE: cut and cast tooth gears; shaft collars in solid or split malleable iron and steel types; backstops to automatically prevent backward movement of conveyors and elevators; gray iron and die-crown welded steel pulleys.



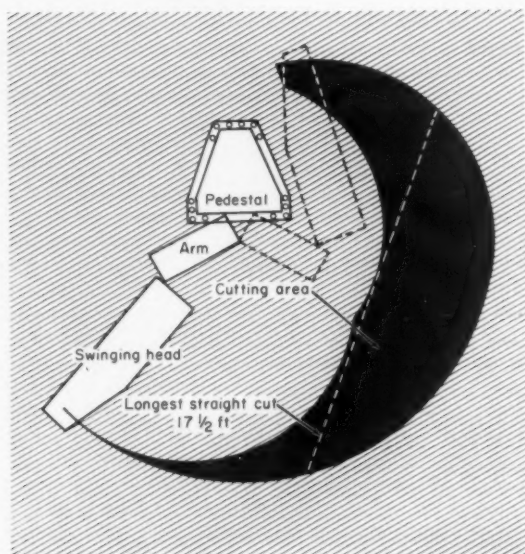
POWER TRANSMISSION MACHINERY

LINK-BELT COMPANY: Executive Offices, Dept. 661-PTD, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs; Switzerland, Geneva. Representatives Throughout the World. 15,210-R

Power transmission for a "portable" bandsaw



WHILE remaining firmly bolted to the floor of the shop, the Pan-Arm Model 5 really is "portable". It can cut in any direction, anywhere within the shaded area shown.



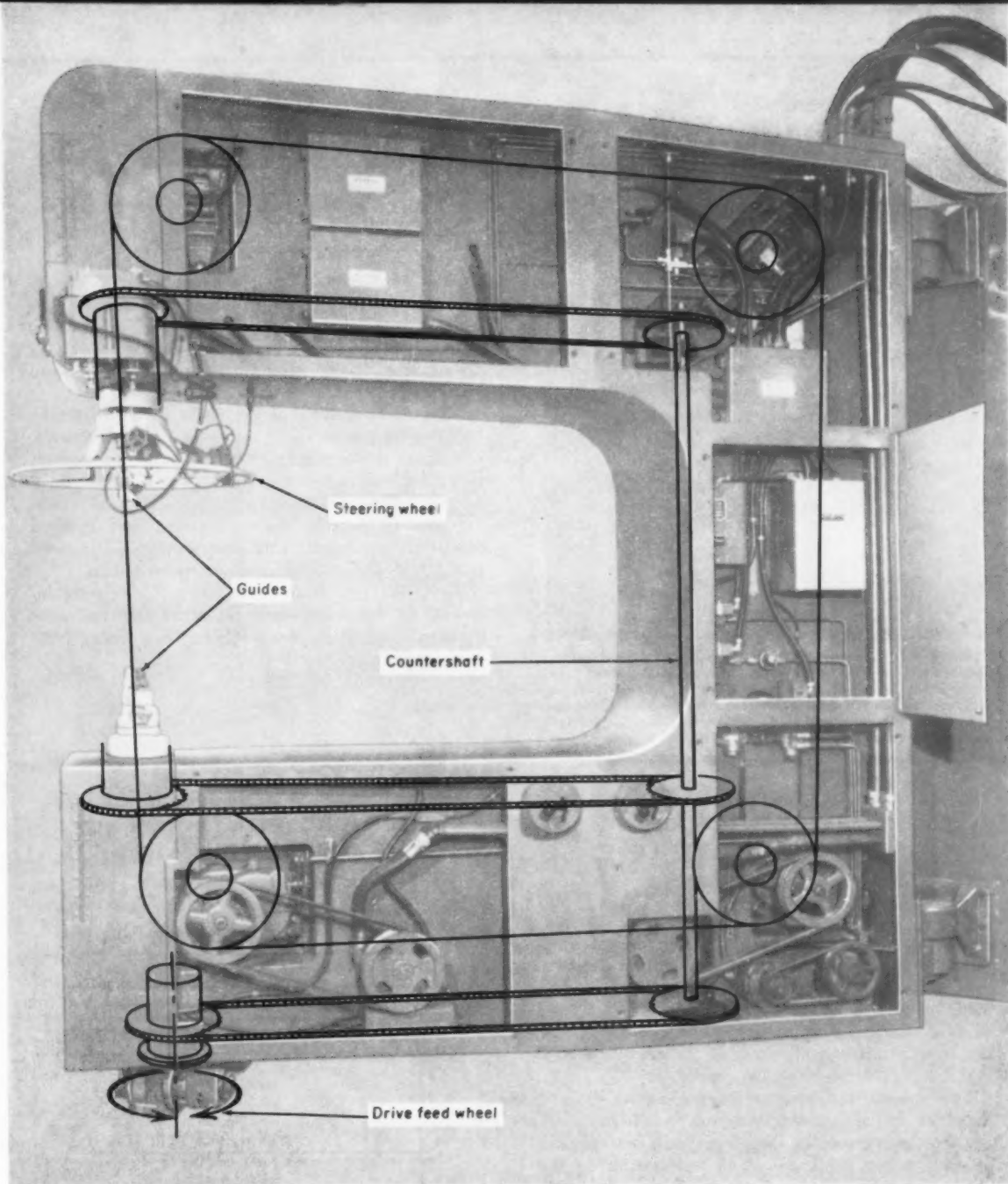
WORKPIECES TOO LARGE or ungainly to be machined by other means can be cut by the Pan-Arm Model 5 bandsaw, and they rarely need moving.

The 17 ft long, 11 ft high, articulated saw is made by the DoAll Co., Des Plaines, Ill. It has a sweeping cutting-yoke hung by antifriction hinges to an intermediate arm, and through that to a floor-mounted pedestal by another set of hinges. Large pieces can be cut within its 99 sq ft unlimited cutting area. Shaping and forming with the saw from solid material is quicker than casting or forging, and less expensive.

A steel feed wheel that rests on the floor beneath the cutting-yoke hung by antifriction hinges to an interby chains and a countershaft to the saw guides so that the driving wheel always feeds the saw blade into the work at the correct angle. For rapid positioning, an air cylinder retracts the feed wheel, leaving the cutting head free to swing.

Band saw speeds range from 25 to 500 fpm. Infinitely variable hydraulic motors coupled to three-speed transmissions are the efficient power system. Two of the 4 saw-blade carrier wheels are driven by a 10 hp, 20 gpm pump. Another 6 gpm pump regulates the main pump, controls band tensioning, and brakes the two free carrier wheels, when necessary.

A steering wheel is used for manually steering the saw blade. When the work is an awkward shape, or



A COUNTERSHAFT SYSTEM, connecting upper and lower band saw guides with the feed wheel, enables the Pan-Arm Model 5 to follow any layout line. The operator can steer the

saw in any direction by turning the feed wheel. This, in turn, causes the saw and the direction-of-feed wheel to turn by exactly the same amount.

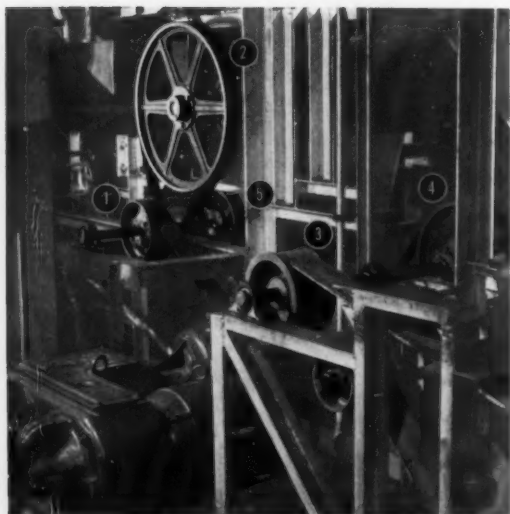
when the operator must be at some distance from the cutting zone, a remote steering control is available. A closed-circuit television is available to assist the cutting.

The base of the main frame contains a chip conveyor and coolant trough. The screw chip conveyor drops the chips in the very small area through which the yoke column moves. The sawing frame is aluminum, to reduce the hinge forces, and to increase feed speeds. A reinforced center plate permits the use of

large access covers for routine maintenance and lubrication.

The saw will readily cut through a foot of steel plate, make internal or external cuts, along practically any curve. For repetitious profile milling, a guide bar can be cut to the required shape to replace the steering wheel. Although flame cutting may be faster than sawing with the Pan-Arm, sawing does not harden the material near the cut. This can often mean a tremendous savings in normalizing costs. ♦

Timing belts for coating machines



TIMING BELTS, reinforced with helically wound steel cables, flex readily, and use considerably smaller pulleys than, say, V-belts. No. 1 belt is from motor-drive to jackshaft; No. 2, jackshaft to roll; No. 3, jackshaft to transmission speed-up; No. 4, transmission speed-up to rewind roll; No. 5, jackshaft to auxiliary rewind roll.

TIMING BELT DRIVES brought about a surprising increase in production for two coating machines. The belts replaced five chain drives on each of the two coating machines used by the Hawthorne Paper Co., Kalamazoo, Mich., after the sprockets had worn badly.

"We changed some of the chain drives to timing belts on one machine," reported Louis J. Slavin, executive vice-president, "and planned to convert the other machine if the timing belts proved satisfactory." But one machine alone handled the coating process, kept it smooth-running, and reduced down-time so considerably that there was no need to convert the second machine immediately.

Now, however, demands at the company have increased to the point where the other machine—now equipped with T. B. Wood's Sons Co.'s timing belts—is also in full production.

Ever-changing speed for a drier drive

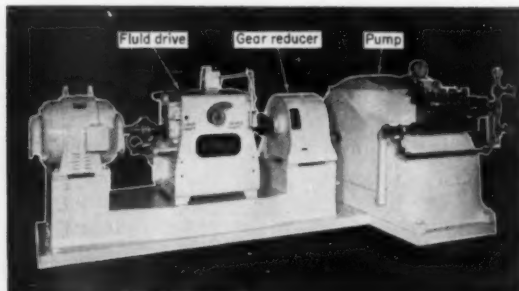
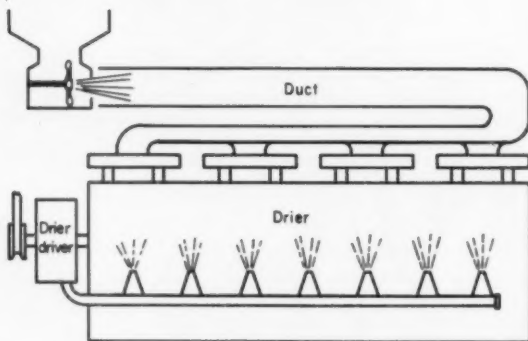
PRECISION SPEED CONTROL allows the use of automatic controls to keep a drier temperature constant.

High pressure dairy drier pump unit with automatic control is made by C. E. Rogers Co. Used to feed dairy liquids to driers for powdering, the unit can pump egg albumen at the rate of 10,000 lb/hr.

The volume and pressure of the liquid entering the drier is controlled by varying the drive speed. Despite the continually changing speed, the unit has given long service. There is no recirculation of the product from discharge back to suction. This reduces the chances of deterioration or physical change on sensitive products.

The unit has a 40-hp, 1800 rpm drive motor which connects to a 2.77:1 gear reducer through a flexible coupling. The pump is a 3-cylinder reciprocator, capable of from 2000 to 3000 psi.

PUMP-DRIVE UNIT at right is used to pump liquids through the system shown above. The product enters the drier as an atomized liquid spray after passing through high pressure lines from the pump. The spray is dried instantly and powder falls to the floor where it is conveyed to an outlet chamber.



Designed To Perform Best In YOUR Clutch Application...

CURTISS  WRIGHT

CLUTCHES

Because the Marquette Division of Curtiss-Wright has a line of clutches for widely diversified uses—and a skilled staff of application engineers—you can be certain that you'll have the *best* clutch for *your* specific job.

Only Curtiss-Wright Clutches combine ALL these advantages in every size and type:

Instantaneous, positive gripping action that eliminates slippage, wear and lost time in cycling operations . . .

High speed operation with negligible centrifugal throw-out action . . .

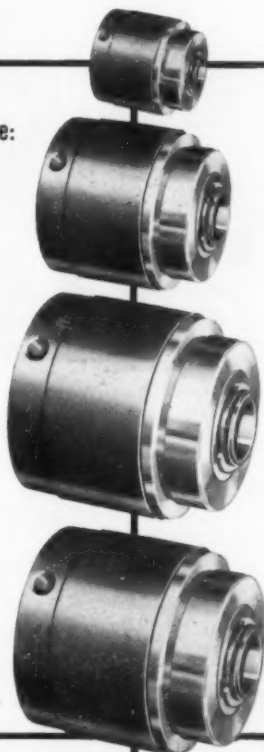
Requires only occasional lubrication and can be located in inaccessible places . . .

Smaller, lighter and more compact per inch-pound of transmitted torque . . .

Low maintenance and long life at constant torque . . .

Lower cost than other types of clutches with comparable torque rating . . .

Versatile Curtiss-Wright clutches can be used to solve many clutching or braking problems. All standard types available in torque capacities from 8 to 1250 pounds-inches.



A Curtiss-Wright Application Engineer will help you select the best clutch for your application:

OVER-RUNNING—BACKSTOPPING for transmitting power during low speed cycle; and over-running during high speed cycle; for use when a reversing motor drives two different mechanisms; to maintain one-direction shaft rotation.

INDEXING for accurate intermittent or indexing motion.

ON-OFF for selectively driving and disengaging in the same direction, where the driven member coasts.

ON-OFF INDEXING for selectively driving and disengaging in the same direction, when driven member must not coast.

INDUSTRIAL SAFETY-LOCK for bi-direction control of rotary motion.

SPECIAL PURPOSE clutches custom designed to specification.

Write today for a complete catalog of Curtiss-Wright Clutches, or for consultation with a Marquette Division application engineer.

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BALL BEARINGS

One of America's largest ball bearing manufacturers



Quiet

We whirl Federal Ball Bearings at different speeds—and we **listen**. Seasoned Audio Inspectors and sensitive Anderometers police our production lines, on the alert to intercept anything but the quiet. They monitor our radial, angular contact and thrust bearings. Also, our self-aligning and shafted types. Single and double row, open and sealed. Result: bearings that purr on the job. Never a growl out of them. Just one reason why so much of industry turns on Federal Ball Bearings. Want more reasons? Contact your nearest authorized Federal Ball Bearing distributor. The Federal Bearings Co., Inc., Poughkeepsie, N. Y.

FEDERAL BALL BEARINGS ARE AVAILABLE THROUGH SELECTED DISTRIBUTORS FROM COAST TO COAST

BEARING SECTION

Bearing Business

The Timken Roller Bearing Co.—is experimenting with extreme condition bearings and lubricants, anticipating space exploration needs.

In the weather room of the Company's research lab., bearings suffer temperatures as low as -80°F and as high as 150°F , with controlled humidity for simulating outdoor conditions. Other facilities test bearings at temperatures up to 1000°F . and speeds to 40,000 rpm.

Hoover Ball and Bearing Co., promoted **Robert B. Parker** director of materials and **Gerald A. Graham** production control manager.

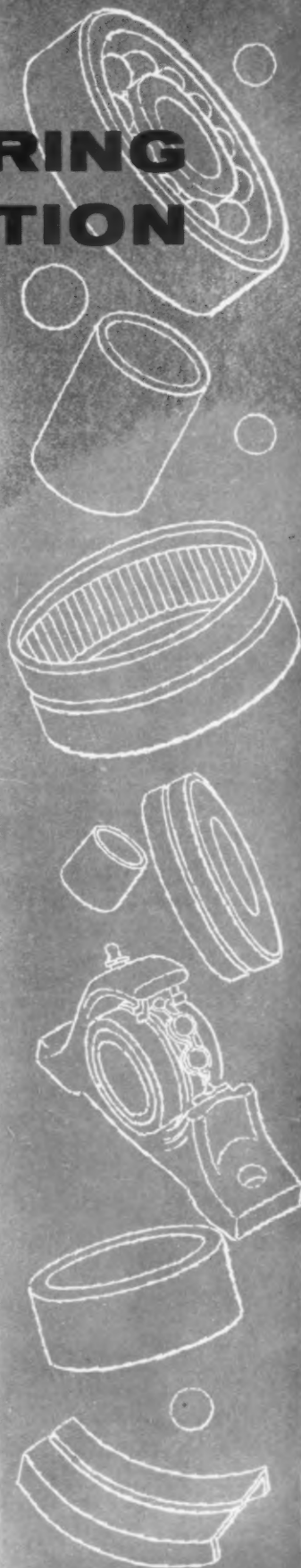
Fafnir Bearing Co.—set up a new training program for maintenance engineers, which has reduced breakdowns resulting from ball bearing failure.

Program consists of a series of seminars in various cities throughout the country which are attended by representatives of firms using company bearings, with invitations coming from Fafnir distributors. Meetings are conducted by a company instructor.

Garlock, Inc. appointed **C. Edward Bellew** manager of the manufacturing division. Bellew fills the position made vacant by the death of vice president **Donald F. Fraser** in Sept. 1960.

The Kaydon Engineering Corp., Muskegon, Mich.,—increased production and reduced manufacturing costs by a voluntary program offered by employees to help the firm become more competitive.

An initial trial period proved the agreement most effective, according to company officials, and the employees, represented by the International Association of Machinists, AFL-CIO. The agreement covers increased production quotas and voluntary reductions in incentive rates. Without reducing take-home pay, the agreement has enabled the company to resume a five-day work week, obtain a near record number of orders, project an employment increase within 90 to 120 days, and plan an expenditure of \$500,000 for improvements, machinery and equipment.



Long needed tests say:

Here's where

By L. J. BRADFORD, *professor emeritus*
Pennsylvania State University

E. M. BARBER, *Texaco Research Center*

and

J. R. MUENGER, *Texaco Research Center*

VERY LITTLE WORK has been done to help industry decide where grease can be used to best advantage. Grease—a blend of oil and soap—is variously regarded as a substitute for oil, or for lubricating high speed bearings where oil would spin off, or for places that cannot be lubricated often.

It isn't generally known, for instance, that grease can be used as a thick film lubricant for journal bearings. Under proper conditions, journal bearings can be run with relatively low coefficients of friction and a low grease supply. A new series of tests undertaken at the Pennsylvania State College under Texaco sponsorship show where and when to grease-lubricate journal bearings.

Grease lubrication is worth considering for low-speed, high-load applications where heat dissipation doesn't depend on lubricant flow. For designers, the important differences from oil-lubricated bearings are

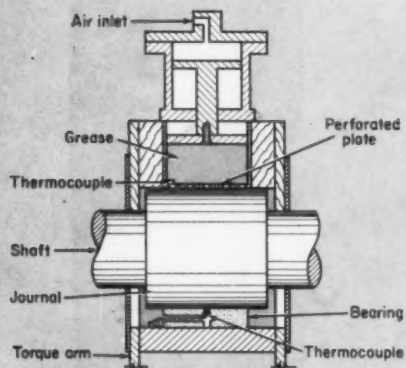
the Non-Newtonian effects, and Thixotropy (viscosity change) of grease. The effects show up when the bearings are not in equilibrium.

The apparatus used consisted of the test bearing between two support bearings, working against a hardened steel sleeve. The sleeve and shaft were in contact on two circumferential lands. Hydraulic loading was applied through the bearing, vertically upward against the shaft. Test bearings were $3\frac{1}{2}$ -in. in diameter by $2\frac{3}{8}$ -in. long.

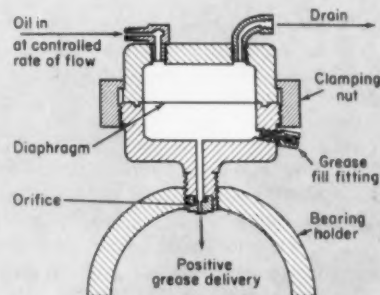
Fourteen No. 2 grade greases were used in the tests. Although it is standard practice to plot lubrication data in terms of film viscosity against bearing friction, a special parameter was used in these tests, shown in Fig. 1. It was felt that there was neither sufficient knowledge of the grease, nor of the bearing film conditions, to correlate them on the basis of viscosity.

Early tests used a perforated plate air-pressure actuated grease feeder. Feed rate was determined by observing the piston motion. Poor reproducibility of results was attributed to the vagaries of its grease feeding. When a controlled rate feeder was substituted, plus a 20-min operation at each test point to establish equilibrium, readily reproducible results were achieved.

The low coefficients of friction observed with grease lubrication are strong indications of a pres-



A SIMPLE SCREW-IN GREASE CUP is used, and transparent bearings. In the early tests, air pressure was adjusted during machine warm-up to the least value to allow steady friction. Beginning with the lowest load, a fifteen minute running period was allowed at each load value. Because this proved unsatisfactory, a controlled rate-of-feed arrangement was set up (right). Readings were taken of time, load, bearing friction, speed, air pressure, grease and room temperatures. Any friction arising from the feeder, end plates, or excess grease is ascribed to the bearing.



to use grease

sure-generating film. A continuous stable film forms over an arc of about 60 degrees. Grease circulation in this film looks very like the oil film in control tests. Unlike oil, however, the shear history of a grease film affects its lubricating properties.

Load and Speed

The tests showed that the load response of a grease-lubricated bearing was similar to that of hydrodynamic bearings.

Effective film arc decreases with increasing speed, consistent with expected increase in minimum film thickness. As speed increases, lubricant feed must often be determined by the required cooling, so that grease will probably be limited to low or moderate speed bearings.

Intermediate clearances give the steadiest performance. Small clearance bearings showed feeding difficulties, and got too hot. High clearance bearings were unsteady. Subsequent tests were confined to clearance of 0.008 in.

Lubricant Qualities

Effects of grease on bearing performance cannot be simply stated. Consistency (thickness) has a marked effect on feed rates whenever a force rather than a displacement controls the flow. Friction is higher than for the base oil.

The grease film is more durable under high loads and less durable under high speeds than comparable oil films. Experiments were carried out with methods of maintaining a thick film without feeding grease. The film ruptured 3000 revolutions after stopping the supply. In most cases, high temperature (100 F) stopped the tests.

The bearing end-plates had some effect on grease film durability. Tests were run on a bearing equipped with end-plates having a quarter-circular relief on the inner edges. The reliefs formed circumferential end-grooves for the bearing. The reliefs tended to fill with grease, and served to relubricate the bearing. Removing the end-plates prevented this relubrication, and decreased the effective film arc.

Deflecting vanes installed in the grooves at the top of the bearing did not help. But deflectors that covered a 60-degree arc, and had a bevel to slide grease into the clearance space, were highly successful. They extended the film arc for most of the greases tested. ♦

Abstract from ASME Transactions, paper 60-Lub-5

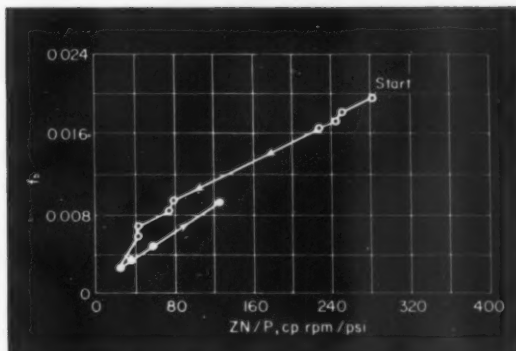


FIGURE 1—INCREASING THE FEED beyond the normal has very little effect on friction. The amount of lubricant needed is not dependent on load. Clearance ratio for the bearing used to produce the above curves, 0.0077; speed, 330 rpm.

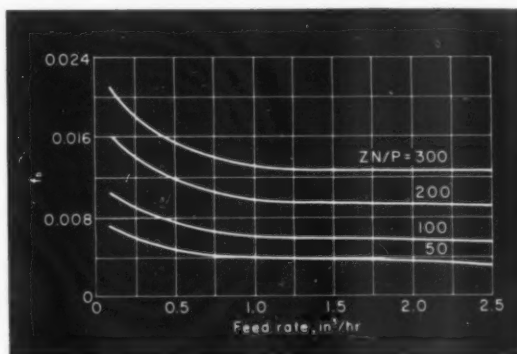


FIGURE 2—FRICTION CURVES for greases fall above those for their base oils. Reducing the consistency by working, or by oxidizing tends to bring the curves closer to those of the base oils. Clearance ratio for the curves, 0.0084; speed 750 rpm. ASTM unworked penetrations top to bottom curves: 256, 293, 315. Feeding characteristics were also affected by consistency. They were 0.8, 11.5, and 11.0 (0.3)-in. per hr.

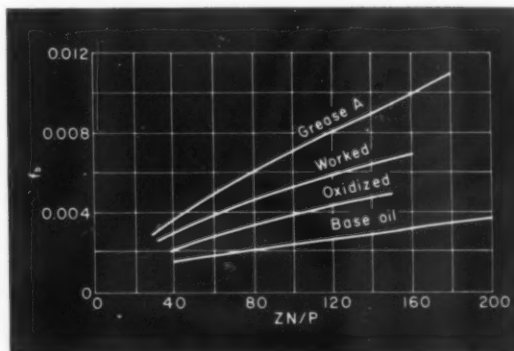
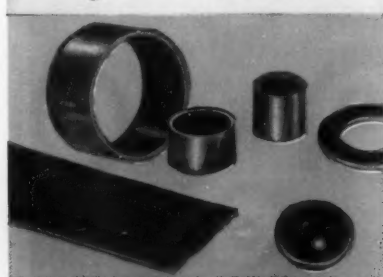
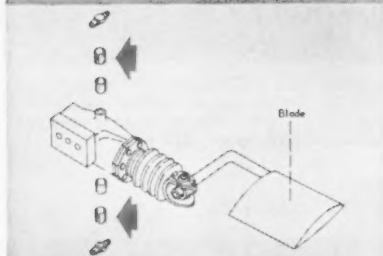


FIGURE 3—GRAPH indicates the effect of shear history on bearing friction (thixotropy). f is the bearing coefficient of friction; Z is the viscosity of the base oil at the bearing temperature, in centipoises; N is the journal speed in rpm; P is the load in lb divided by the product of journal diameter and bearing length, both in inches. These units are conventional for work in this field.

EXAMPLE #5



DU bushings (bottom) used in the rotor assembly (center) of Navy's all-weather helicopter (top), require no maintenance, last as long as the rotor itself under severest conditions.

DU* DRY BEARINGS Solve Another Problem

"On the basis of very successful results obtained from rigorous whirlstand testings which simulate in-flight rotor conditions, we incorporated DU bearings into production."

A. A. Coronato
Chief Component
Development Engineer
Sikorsky Aircraft Div.
United Aircraft Corp.

Used to eliminate the necessity of lubrication on the rotor damper assembly, DU bushings replace ten fittings that required daily greasing on the Navy's HSS-2 helicopter built by Sikorsky. The bushings offer satisfactory, trouble-free service for the entire life of the rotor hub despite a heavy load (1250 pounds at 203 cycles per minute, uni-directional), shock, vibration, intermittent motion and a corrosive environment.

DU metal is an ideal bearing material for many applications. It withstands much higher velocities, runs much cooler at lower speeds than other unlubricated bearings . . . has a compressive strength of 51,000 p.s.i. DU metal is applied without the need for temperature-limiting adhesives . . . will withstand from -450°F to +536°F.

GARLOCK

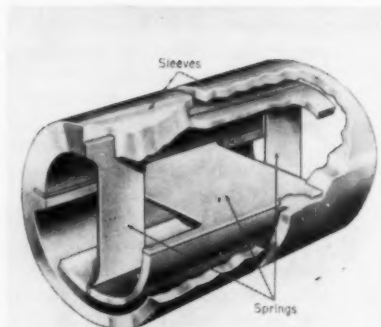
Apply DU dry bearings to appliances, automobiles, aircraft, farm and industrial machinery, office equipment. Standard bushings available for $\frac{1}{4}$ " to 5" shafts; thrust washers for $\frac{3}{8}$ " to 2" shafts; hemispherical cups from $\frac{5}{8}$ " to $1\frac{1}{2}$ "; strip available for special fabrication. Write for engineering catalog DU-458. Special Products Dept., Garlock Inc., P. O. Box 612, Camden 1, New Jersey.

*Trademark, Glacier Metal Company Ltd.



Circle 30 on Reader Service Card

Precision at for a flight



CUTAWAY of the cantilever type of Bendix Corp's new flexural pivot bearing. This type will be used in supporting overhung loads.

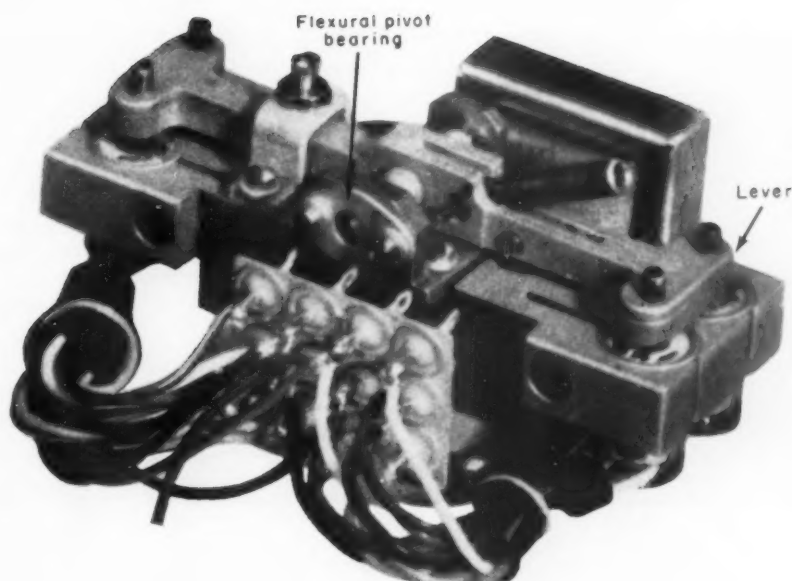
A FLEXURAL PIVOT bearing developed for an automatic flight control system is free of backlash and hysteresis.

It is used by the Bendix Corp., Utica, N. Y., to convert the linear motion of a mechanical diaphragm into rotary shaft motion. The diaphragm expands and contracts nine millionths of an inch for each foot change in the missile's altitude. Despite its precision performance the bearing is easy to install, and relatively low in cost.

It consists of a pair of mating tubular sleeves of equal length interconnected by crossed flat springs. Each sleeve is machined so that half its length consists of a tongue section of reduced outer diameter. This rotates within a corresponding slot section of increased internal diameter in the mating sleeve. Each spring is anchored to both sleeves, and relative rotation of up to 60 degrees is possible. The pivot is used as a bearing by securing the linkage arms of the load to each sleeve section.

low cost control

THE AIR DATA SENSOR, using a flexural pivot bearing, is capable of detecting altitude changes of a foot, corresponding to only millionths of an inch of motion.

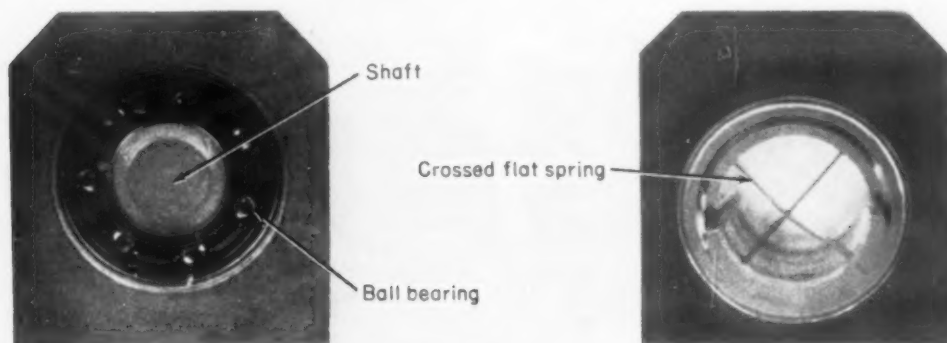


Before development of the flexural pivot bearing, Bendix used an assembly of more than 12 parts. It consisted essentially of a shaft mounted in ball bearings. Production of the shaft was exacting and expensive. Three different diameters of the shaft were machined within 0.3 thousandths-in. Radial clearances in the ball bearing had to be eliminated by shimming, to less than 0.1 thousandths-in., plus a spring washer to take care of the differential expansion of the materials. A tension spring was needed to preload the

connecting mechanism.

In contrast, the bore of the flexural bearing is only held to 5 thousandths-in., and installation means tightening three screws. It is unaffected by dirt, vacuum, radiation, or high or low working temperatures.

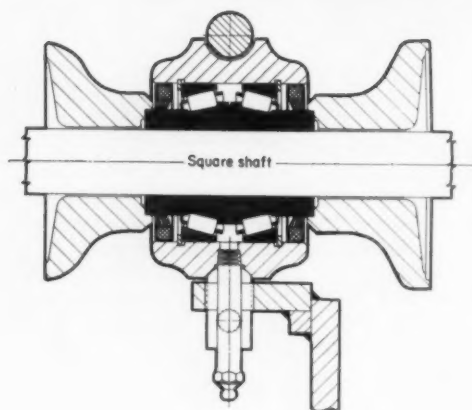
The company has produced two types of its new bearing in seven standard sizes with diameters ranging from 5/32-in. to 1/2-in. And the flexural pivot bearing will soon be offered to the original equipment market. ♦



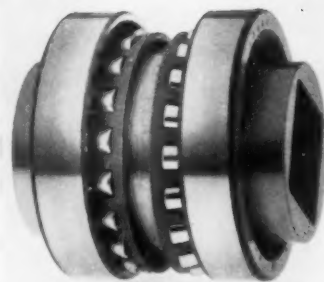
ORIGINAL SHAFT and ball bearing (left), compared with the new method. The pivot bearing can be preloaded during

installation by rotating one end relative to the other. It must be held in this way by the installation screws.

Bearing has square hole



THE ALTERNATIVES to a square hole bearing are a round shaft, or a square shaft with round hole bearings. In the first case, each disk must be made fast to the shaft individually. In the second case, the off-the-shelf bearing needs a square-hole insert. Using special square hole bearings was found to be easier, more sure, and less expensive.



FOLLOWING TWO YEARS OF EXTENSIVE FIELD TESTS, a double row tapered roller bearing with a square hole was engineered into a rugged disk harrow.

The disks are mounted on a square axle supported by the square hole bearings. This is to provide a positive lock against rotation of the inner bearing race on the axle, as well as a positive lock for the disks.

Square hole spools, which act as spacers between disks, are likewise positively locked against rotation. By preventing the bearing and the spools from rotating on the axle, friction and wear between the bearing ends and the spool are eliminated. A tight fit between bearing, disks, and spacer spools can be maintained without any adjustment. The square bore simplifies mounting or assembly and disassembly, since the bearing can be mounted directly on the square axle. Since the bearings are fitted with limited clearance the axle is free to deflect slightly to com-

pensate for heavy shock loads on the disk assemblies.

The ease of maintenance of the bearing is another important asset. Lubrication twice a year, at the beginning and end of each season, is all that is required. Old style sleeve bearing applications may require up to four pounds of grease and an hour's greasing time each day.

Another feature of the square hole bearing used in this application is the extended cone with a hardened, smooth ground surface. It enables the grease seals to operate at maximum efficiency in keeping dirt and dust out, lubricant in, and maintenance down.

Disk harrows mounted on square hole, double row Timken Co. bearings are easier to pull, making it possible for larger disks to be pulled in a higher gear. Blades turn more freely, scour and cut better. For the agriculturalist, square hole bearings mean more land worked in less time. ♦

THEY LAST LONGER!

—America's Quality Pillow Blocks

For 37 years Dodge Pillow Blocks with Timken Bearings have been proving their superiority under extreme service conditions in *all* kinds of applications throughout industry.

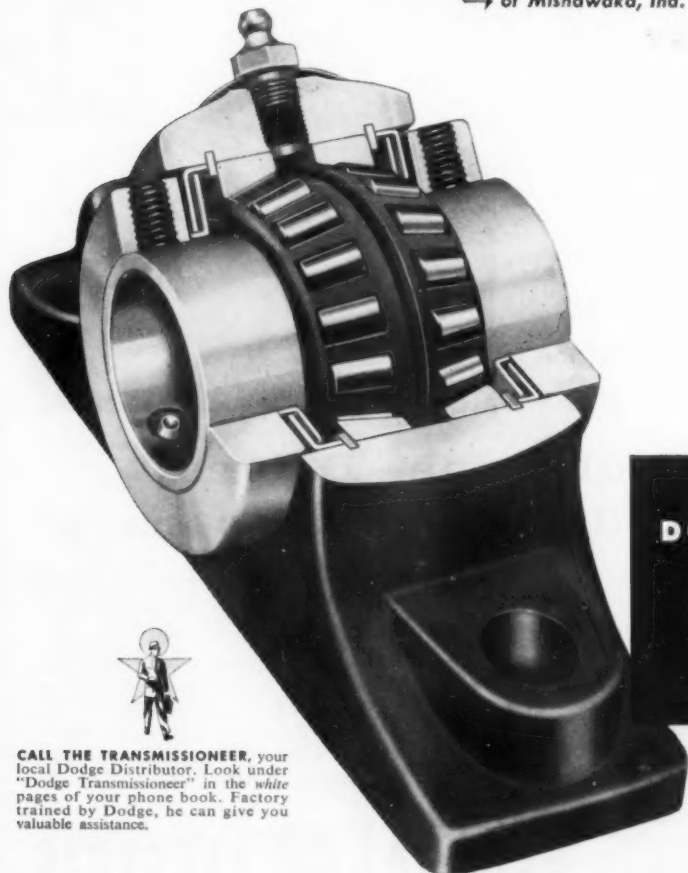
They are noted for their ruggedness. They are built to outlast the demands of the jobs on which they are used. And they carry their loads—radial and thrust, or any combination of the two—with minimum attention.

Dodge takes ~~no~~ chances with the fine precision built into these pillow blocks. They are painstakingly assembled, expertly adjusted, pre-lubricated and SEALED at the factory. You slip them onto your shaft in mint condition—and they stay that way!

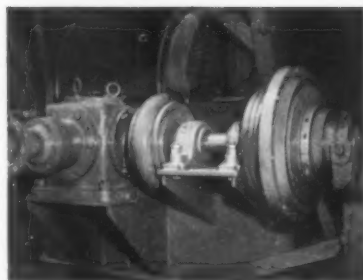
There are 5 types of Dodge Pillow Blocks with Timken Bearings—Type E, Double Interlock, Type C (all with shaft sizes from 1-7/16" to 4-15/16", and down to 1-3/16" in Type E), Special Duty with shaft sizes to 12" and All-Steel—2-15/16" to 10". Available from your Dodge Distributor's stock. Call him, or write us for technical bulletin.

Dodge Manufacturing Corporation, 8200 Union St., Mishawaka, Ind.

The Products with the Pluses... **DODGE**
of Mishawaka, Ind.



CALL THE TRANSMISSIONEER, your local Dodge Distributor. Look under "Dodge Transmissioneer" in the white pages of your phone book. Factory trained by Dodge, he can give you valuable assistance.



Dodge Type E Pillow Blocks with Timken Bearings used for the drive hook-up of a rotary percussion drill.



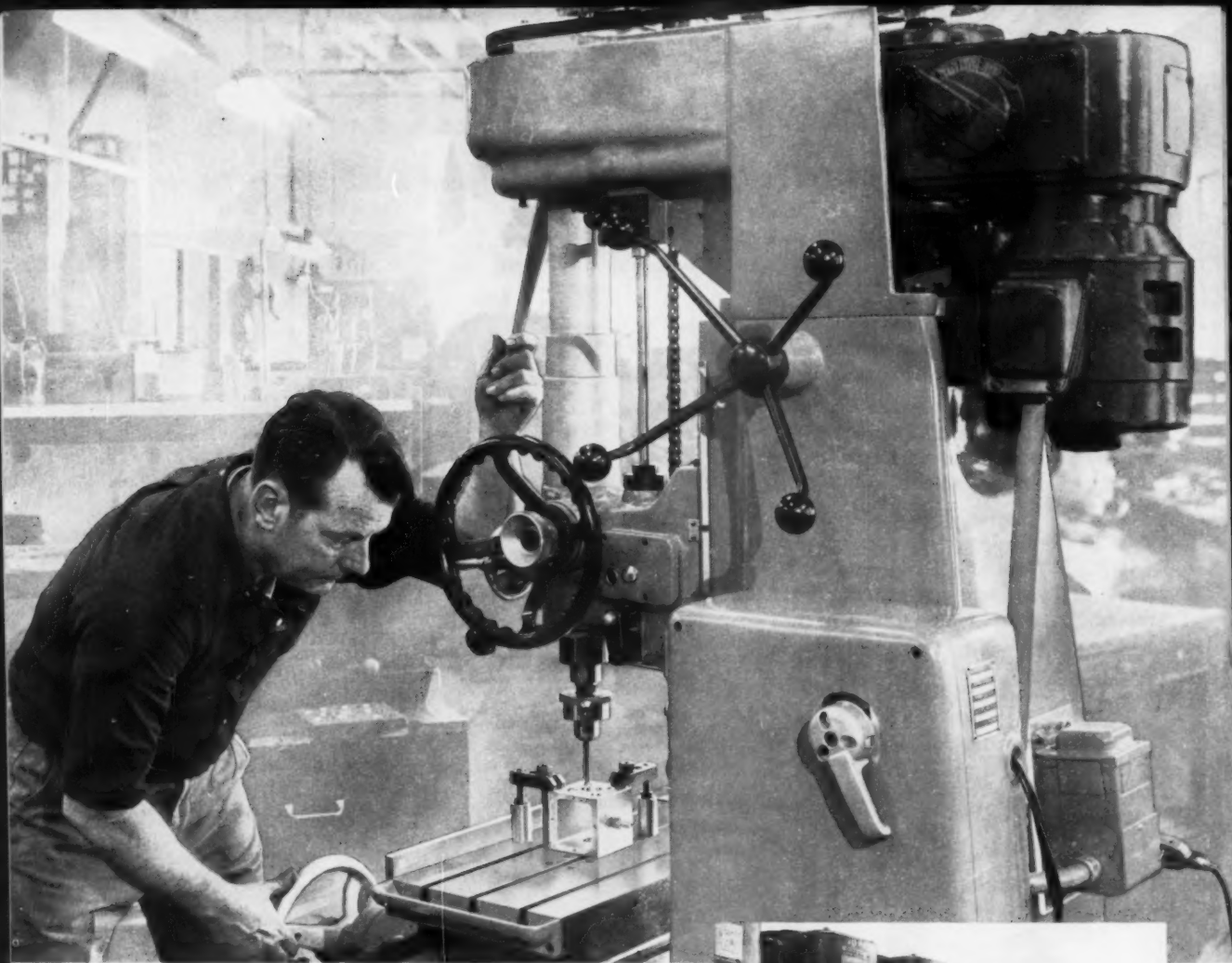
Dodge Type C Pillow Block with Timken Bearings in cement plant — one of 4 in use on elevators since 1930.



Dodge Special Duty Pillow Blocks with Timken Bearings used on a skip hoist bull wheel for a blast furnace.

DODGE PILLOW BLOCKS
with
TIMKEN BEARINGS

See Dodge Bearings-On-Parade at
DESIGN ENGINEERING SHOW
Dodge Exhibit — Booth 322



Mr. A. A. Lindberg, Design Engineer,
Moore Special Tool Co., Inc. states:
"On our Model 1½ Jig Borer..."



General Electric Polydyne® Drives Help Us Maintain 0.000070" * Accuracy"

"Efficient control of vibration is the reason that the majority of our Model 1½ jig borers are equipped with General Electric Polydyne drives. Competitive drives have never fully solved this problem," states A. A. Lindberg, Design Engineer for Moore Special Tool Co., Bridgeport, Connecticut.

"Moore tests each Polydyne drive on a specially constructed bracket," continued Mr. Lindberg. "Vibration readings are taken at three points, and every Polydyne drive tested has been under the vibration limit of 0.001 inch and virtually free of operating noise."

"Another reason that our Model 1½ has proved

popular is that the Polydyne drive gives an infinite number of operating speeds with just a simple adjustment of the dial to the desired rate."

When your application requires low-cost adjustable speed combined with reliability and ease of maintenance, investigate G-E Polydyne drives. Your General Electric Sales Engineer has full details. Or, write for bulletin GEA-6806, Section 854-06, General Electric Company, Schenectady 5, N. Y.

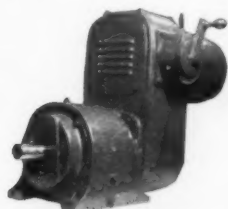
* Seventy Millionths

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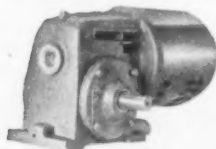
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General Electric Polydyne Drive



Integral-type Gear Motor



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Footed Speed Reducer



Shaft-mounted Speed Reducer

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GENERAL ELECTRIC

PRODUCT NEWS

To get complete information on these products, use the Reader Service Cards bound into this issue.

Worm reducers

A line of fan-cooled worm reducers has a rating range from .05 hp, 1½ in. center distance, to 1050 hp, 36 in. center distance, in single and double reduction units. Single wall, finned construction cases, centrifugally cast phosphor bronze gears. Six types: Type D verso unit, adapts to any mounting position, ratios 5:1 to 70:1 hp .062 to 13.5. Type V, vertical single reduction, shaft up or down, ratios 5:1 to 70:1, hp .062 to 150. Type B, horizontal single reduction, bottom drive, ratios 5:1 to 70:1, hp .062 to 150. Type HB, horizontal helical worm, right angle drive, ratios 15:1 to 355:1, output torque 2460 in. lb to 135000 in. lb. Type T, horizontal single reduction, top drive, ratios 5:1 to 70:1, hp .062 to 150. Type DB, horizontal double worm, parallel input and output shafts, ratios 75:1 to 4900:1, output torque 4170 in. lb. 135000 in. lb.

*De Laval Steam Turbine Co.,
Trenton N. J.*

Circle 255 on Reader Service Card

Tolerance Ring

The Star tolerance ring is a corrugated open ring of hardened steel. It acts as a wedging shim between a shaft and its mating part, or to fix any round member in its mating hole without interference fits or keys. Six sizes with max. shaft diam. from .250 to .750 in. Bore diam. from .283 to .822 in., and bore depth from .635 to 1.080 in. The ring has wide tolerances due to its elasticity.

*Roller Bearing Co. of America,
West Trenton, N. J.*

Circle 233 on Reader Service Card

Tachometer pickup

Model 2040, an explosion-proof magnetic tachometer pickup with

a heat-treated cast aluminum housing, produces high amplitude, low modulation, sine wave signals, in lieu of existing ac or dc analog signals, proportional to speed, rpm. Designed for use on aircraft and

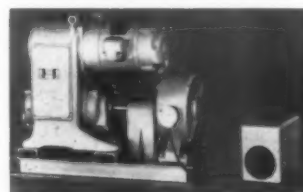


automotive engines and test stands, the pickup can be adapted for any rotating devices where a high ratio of electrical impulses per revolution is needed for counters, rate meters and electronic tachometers. Standard frequencies are 60 or 120 impulses per revolution, and the unit is adaptable to a range of 1 to 240 impulses per revolution. Weighing 2½ pounds, the 2040 has a speed range of 75 to 10,000 rpm, and an output voltage of more than 1.0 volts rms at 100 rpm.

Electronic Div., Meriam Instrument Co., Cleveland, Ohio.

Circle 234 on Reader Service Card

Variable frequency source unit



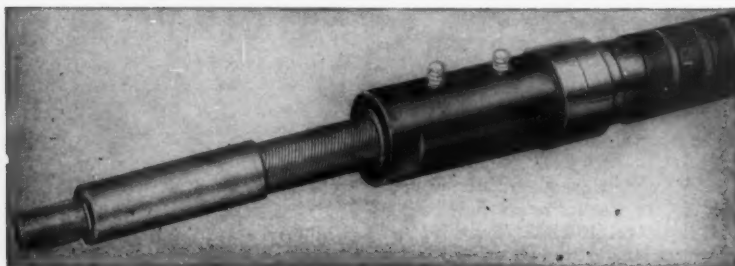
"Nobrush" variable frequency source unit is designed to test 400 cycle components over a wide fre-

STOW FLEXIBLE SHAFTING

The Ideal PTO Drive



1 1/4" flexible shaft under tractor-trailer transmitting 10 HP.



1 1/4" core assembly pulled out of casing. Note steel-backed bronze sleeve bearing.

Here are five big reasons why flexible shafting is an ideal power take-off drive on trucks and tractor trailers.

FLEXIBLE SHAFTING:

1. Can connect a drive shaft and a driven shaft which are working at different angles and located in different planes.
2. Eliminates the need for accurate alignment.
3. Eliminates dangerously exposed revolving parts; no safety guards required.
4. Replaces connections affected by vibration.
5. Is economical because it is so easy to install and maintain.

Available with built-in bearings and couplings in sizes from 1/4 inch to 1 1/4 inches in diameter—STOW flexible shafting can help solve your trucking and maintenance problems *in advance*. The know-how of 85 years experience goes into every STOW flexible shaft!

STOW flexible shafts are being used on trucks and tractor-trailers to:

- Operate pumps for petroleum, other liquids and hydraulic pumps on dump trailers.

- Operate conveyors for grain and coal.
- Operate compressors on refrigeration trucks.

Our Engineering Department will be glad to work with you on any special drive problems. For complete data on flexible shafting sizes, torque capacities, and other specifications, write for STOW Engineering Bulletin, No. 570, and Tractor-Trailer Bulletin, No. 542.



STOW MANUFACTURING CO.

440 Shear St.

Binghamton, New York

Circle 50 on Reader Service Card

PRODUCT NEWS

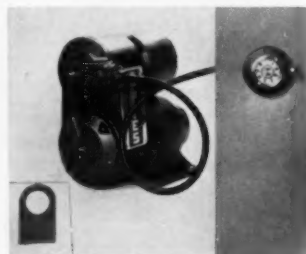
quency and voltage range. Frequency range is 380 to 420 cycles. Voltage variable is 105 to 125 volts, 3 phase line-to-neutral (182 to 217 volts, line-to-line). Operates from standard 3 phase, 60 cycle input, output is 3 phase, 4 wire, 5 KVA. Variable ratio pulley drive and variable ratio auto transformer on output, both manually adjustable, make possible any desired combination of voltage and frequency within machine's range. (remote control available for both voltage and frequency). Ratings are available between .60 KVA and 25 KVA. Single phase or 50 cycle input is also available.

Georator Corp., Manassas, Virginia.

Circle 236 on Reader Service Card

Remote control for drives

Mechanical remote control for changing output speeds on Reeves Variable Speed Motodrives of a flexible shaft and an indicator handwheel. You turn the handwheel to change speeds, and a dial on its face shows speed setting. The handwheel is designed for panel or wall mounting. A bracket



is available for machine or free-standing mounting. The flexible shaft, which connects the handwheel to the Motodrive, uses anti-backlash construction, so that handwheel movements are transmitted without absorption by the shaft. Standard shaft is 5 ft. long; other lengths can be specified. Control is available for use on Motodrives rated 1/2 through 2 hp. Kits available for converting drives now in use.

Reliance Electric & Engineering Co., Cleveland, Ohio.

Circle 237 on Reader Service Card

Torque wrench calibrator

For checking and resetting all types of torque wrenches. Calibrator may

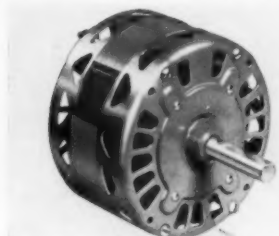
be bench-mounted or clamped in a vise. Needs no piping, wiring or other external connections. Measures both right and left hand torque and is accurate within one percent of full-scale reading. Six models, five types, covering torques up to 2000 ft-lb.

Skidmore-Wilhelm Mfg. Co., Cleveland, Ohio.

Circle 238 on Reader Service Card

Fractional hp motor

Type AR motor is said to have higher starting and running torques than available in conventional shaded pole motors. With a diameter of 4 1/4 in., it is suitable for heavier duty jobs with space limi-



tations such as heating, refrigeration, appliances, etc. A 6-pole motor, Type AR is available from 1/20th through 1/4 horsepower.

Redmond Co., Inc., Oucosso, Michigan.

Circle 239 on Reader Service Card

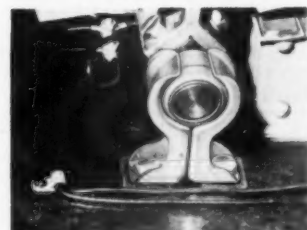
Air clutches

The Air Champ series includes a lightweight (LW) model and a medium weight (MW) model, both with combination sheave. Intended for low-torque, soft start applications, the clutch will mount on motor or driven shafts, and operate on static air pressure without needing rotary air joints. Use with motors up to 10 hp or where less than 800 in. lb torque are needed.

Horton Mfg. Co., Inc., Minneapolis, Minn.

Circle 240 on Reader Service Card

Pedestal pillow block



A custom design, this pedestal pillow block has a stamped support with double-channel cross section

which provides a sturdy mounting for sleeve type bearing ball units. Ball and socket combination for self alignment eliminates need for shimming or machining.

Triangle Mfg. Co., Oshkosh, Wis.

Circle 241 on Reader Service Card

Simulated baro indicator

Unit is made up of a servo motor, two synchro transmitters, a gear train and an electrical connector. Its function in conjunction with a dial assembly, is to provide visual indication of attitude-pressure be-

ing measured by remote transmitters. These transmitters feed pulse to the servo motor. In turn the motor feeds through the gear train, which reduces the 5600 rpm's of the motor to 10 rpm's at the coarse synchro and 1/2 rpm at the fine synchro. Transmitters show the action on a dial.

Sterling Precision Corp., Port Washington, N. Y.

Circle 242 on Reader Service Card

Hydrostatic transmission

The Dynapower design composes a variable displacement axial pis-

SALSBUURY AUTOMATIC CLUTCHES AND TRANSMISSIONS

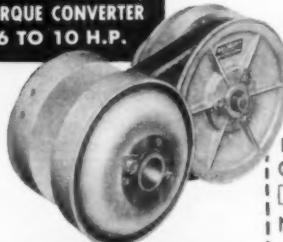
MODELS FOR ANY APPLICATION From Stock, or Custom-Designed

Whenever you need smooth, dependable automatic transmission of power, specify Salsbury Automatic Clutches or Torque Converters. There are no gears to shift, no clutch pedals to operate — just a smooth, efficient transfer of power from motor to load through centrifugal force as the engine is accelerated. You get load-free idling, velvet smooth starting and a steady, even flow of power through the infinitely variable range of speeds between "low" and "high." Salsbury Automatic Clutches and Torque Converters are approved for industrial or vehicular use by leading manufacturers.

Solve Transmission Design Problems

Salsbury's staff of power transmission engineering specialists will gladly assist you. All inquiries will be held in strictest confidence and there is no obligation, of course. Please write, wire or telephone today.

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6 TO 10 H.P.



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CENTRI-DYNE
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6 TO 100 H.P.



"400"
TORQUE CONVERTER
2 TO 5 H.P.

25 YEARS of
specialized power
transmission engineering
experience backs
every Salsbury product

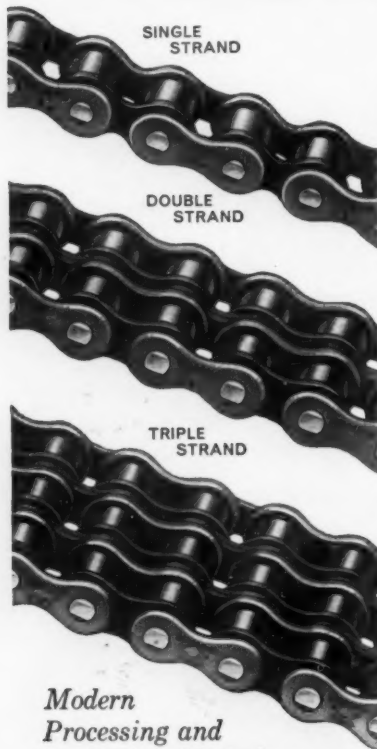
MAIL COUPON
FOR ENGINEERING
DATA SHEETS

SALSBUURY CORPORATION, Dept. PTD
1161 East Florence Ave., Los Angeles 1, Calif.
Gentlemen: Please send me data sheets on
☐ Clutches, ☐ Torque Converters, _____ H.P.
Name _____
Position _____
Firm _____
Address _____
City _____ Zone _____ State _____

Circle 59 on Reader Service Card

FOR EVERY NEED

DIAMOND ROLLER CHAIN



Modern Processing and Packaging Methods...

demand the utmost in precision, dependability and economy—the kind of service you get from DIAMOND Roller Chain. For every processing or conveying movement, power transmission, timing or synchronization... there's a DIAMOND Roller Chain to do the job most efficiently.

Write now for your
copy of Latest
DIAMOND Chain
and Sprocket Catalog!



DIAMOND CHAIN COMPANY, INC.

A Subsidiary of American Steel Foundries
Dept. 718 • 402 Kentucky Ave.
Indianapolis 7, Indiana

Circle 20 on Reader Service Card

PRODUCT NEWS

ton pump connected to an axial piston motor (fixed or variable). Features of the transmission are: a 90 to 95% interchangeability of parts between pump and motor; a fluid reservoir—transmission works with 1/10 of the fluid; control valves that are built in as part of the motor; and the filter and heat exchanger (if needed) can be of the low pressure type. Advantages show maximum torque at any engine speed including idle, no slipping or stalling; and precise control under all conditions.

The New York Air Brake Co., Watertown, N. Y.

Circle 243 on Reader Service Card

Constant level oiler

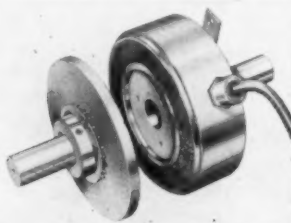
Style CS oilers, for extra heavy duty will automatically retain the oil in a bearing at a constant level which is visible in a glass sight below the reservoir. Filled through a top filler cap. Either side or bottom outlet, both with 1/2 in. pipe thread. A shut-off holds oil supply in the transparent reservoir when the filler cap is removed. Air filter can be inserted on a 1/2 in. female pipe thread. Aluminum alloy and brass construction, glass or lucite reservoir.

Oil-Rite Corp., Manitowoc, Wis.

Circle 244 on Reader Service Card

Magnetic clutch

The stationary magnet of the 5.5 SMR is ball bearing mounted for easy alignment. Coils for voltages to 115 dc. Torque up to 45 ft lb is transmitted by a splined arma-



ture to the driven hub. Clutch converts to a magnetically set brake by securing the rotor to the magnet body. Also available in an integral clutch-brake combination rated at 45 ft lb, with both clutch and brake magnetically set.

Stearns Electric Corp., Milwaukee, Wis.

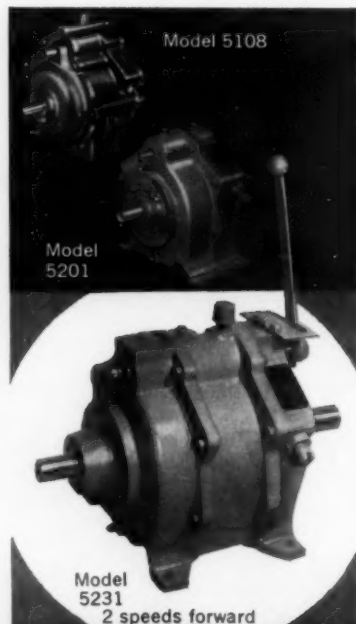
Circle 245 on Reader Service Card

Motor control

The Reactron is a static ac power compensating transformer which

S-N REVERSING TRANSMISSIONS

5 models 8 and 28 h.p.
with power packed
versatility



S-N Reversing Transmissions are performance proven, space-saving single units which reverse under full load. Adaptable to the design or redesign of a wide variety of industrial equipment. For technical data write The Snow-Nabstedt Gear Corp., Hamden, Conn.

SPECIFICATIONS

Model No.	5231	5201	5108
Reduction Forward	1.97:1 3.34:1	3.16:1	3.75:1
Ratio-Reverse	3.37:1	3.16:1	3.75:1
Power Up To	28 HP	28 HP	8 HP
Max. Input Torque in. lbs.	1000	1000	320
Max. Input Speed RPM	2400	2400	2400
Dimensions	Long 15 1/16" Wide 14" High 14 1/4"	11 1/2" 13 1/2" 14 1/4"	9 1/16" 10" 10 1/2"



SNOW-NABSTEDT

Industrial Division
Transmission Engineers
For Over Half a Century

Circle 47 on Reader Service Card
POWER TRANSMISSION DESIGN

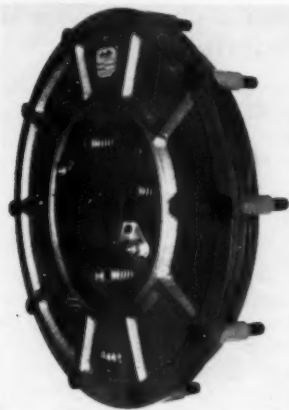
can be used with silicon rectifiers to provide constant but infinitely adjustable motor speeds, on dc shunt-type motors from ac supply. Motors 1/50 thru 1 hp with inherent thermal protection.

Vee Arc Corp., Westboro, Mass.

Circle 246 on Reader Service Card

Air clutch/brake

The Power-Flo clutch/brake has silicone rubber diaphragm which is



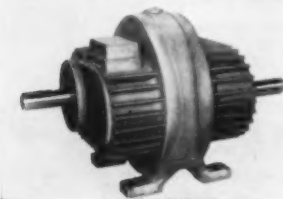
fiber glass reinforced and can take temperatures up to 500-600 F. Internal clutch drag is eliminated by a self centering ring for the torque plates. Two models—the 16S350 and the 18S400. Capacity of the 16 in. model is 32,500 in. lb torque at 80 psi, 50 hp at 100 rpm. The 18 in. model takes 52,000 in. lb torque, rates 82 hp at 100 rpm.

Mid-States Industrial Clutch Co., Wichita, Kansas.

Circle 247 on Reader Service Card

Compact transmission

Called Electromission, its for applications to machine tools and au-

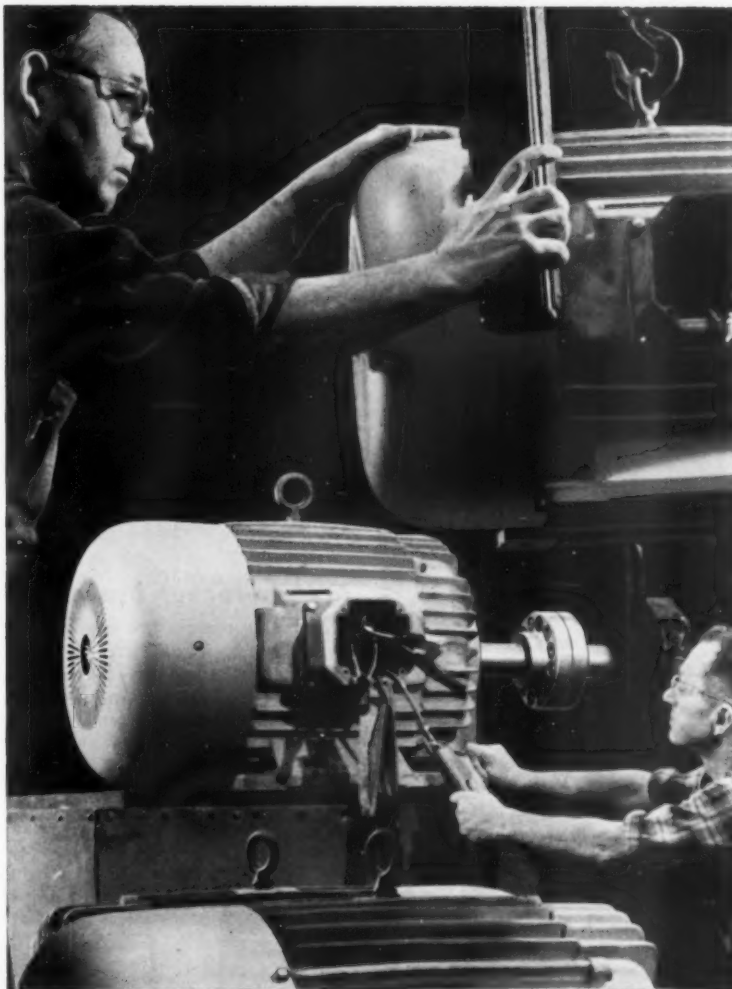


tomation and servo systems. Transmission consists of input and output shafts connected through either a gear drive or chain drive, depending on the status of two opposing electromagnetic clutches. Five hp, 180 in. lb torque, reversing in 0.2 seconds.

Airborne Accessories Corp., Hillside, N. J.

Circle 248 on Reader Service Card

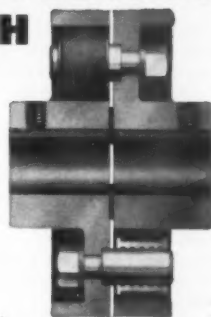
continued on next page



DYNAMOMETER TESTING TIME SAVED WITH AJAX FLEXIBLE COUPLINGS

Hours are saved by one of America's foremost motor manufacturers because of the quick hook-up made possible by AJAX Flexible Couplings. Their quick connect and disconnect provides practically instant engagement and disengagement between motors and dynamometers.

AJAX Rubber-Cushioned, Sleeve Bearing design also saves line-up time and eliminates end-float problems. Motors being tested range from 40 to 150 HP.



Cross Section of AJAX Rubber-Cushioned, Sleeve Bearing Coupling.



Write for complete information on AJAX Rubber-Cushioned and Dihedral Gear Type Couplings.

AJAX FLEXIBLE COUPLING CO. INC.

132 Portage Road

Westfield, N. Y.

Representatives in Principal Cities

IN CANADA — The Alexander Fleck Ltd., Ottawa

Circle 4 on Reader Service Card



**ORIGINATOR
AND LEADING PRODUCER
OF EDDY-CURRENT
SPEED CONTROL
EQUIPMENT**



**DYNAMATIC DIVISION
EATON
MANUFACTURING
COMPANY**

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KENOSHA, WISCONSIN

PRODUCT NEWS

Electric clutches, brakes

A new line of fractional hp clutches, brakes and clutch couplings come in two sizes—.875 in. and 1.725 in. diameter. Both sizes operate at 28 or 90 volts. The .875 in. model provides 2 in. lb of torque, the 1.725, 10 in. lb torque. Series covered the FS 08 and FS 17 brakes; and the FH 08 and FG 17 clutch couplings. Standard bores on armature hub for brakes are 1/4, 5/16, and 3/8 dia. Standard bores on armature and rotor are 1/4 and 3/8 dia. for clutch couplings.

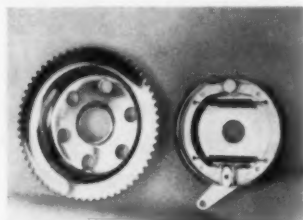
Haydon Div., General Time Corp., Torrington, Conn.

Circle 249 on Reader Service Card

Drum-sprocket brake

This brake assembly is applicable where space is limited between axle suspension points. The lever actuated internally expanding brake mechanism is mounted on the axle and remains stationary. Drum and driven sprocket is made in one piece and revolves around the brake mechanism. The 5 in.

drum is flanged to form the sprocket. Two sizes of drum sprockets, 7.38 and 8.81 in. dia. Smaller



sprocket has 60 teeth and larger 72 teeth. Depth of entire assembly is 1 1/2 in.

Fairbanks, Morse and Co., Chicago, Ill.

Circle 250 on Reader Service Card

Precision spur gears

Fine pitch precision spur gears range from 1/10 to 2 1/4 in. outside dia., are used in precision components, instruments etc. Standard sizes range from 48 to 120 D.P.—10 to 48 teeth in stainless steel and 42 to 180 teeth in aluminum. Each gear certified to be AGMA Precision Class I or better. Available from distributor stocks.

Boston Gear Co., Quincy, Mass.

Circle 251 on Reader Service Card

**SHAFT MOTION INDICATOR
PROTECTS MACHINERY
BY INDICATING STOPPAGE
DUE TO OVERLOADING
OR MALFUNCTION**

A and B: On end return idlers, warn if conveyor should break, slow or stop.
C: On boot pulley, signals slowdown, stoppage, slippage due to overload, boot pulley out of adjustment. Helps prevent fires.
D: On screw conveyor, warns of slowdown due to overloading. Prevents damage.
E: On rotary feeder, warns of slowdown; prevents plugging damage.

Roto-Guards can be wired into interlock system; stoppage of one component automatically stops others; prevents damage.

Write for Bulletin RG-21 or call TUzedo 2-3000

THE BIN-DICATOR CO.
17190-E3 Denver • Detroit 24, Mich.
We Sell Direct • Phone Orders Collect

Circle 9 on Reader Service Card

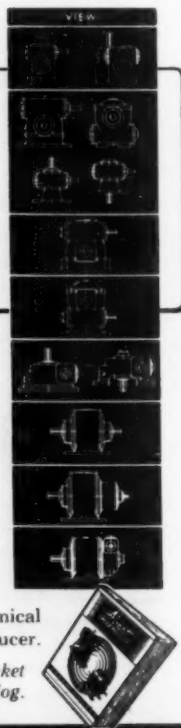
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**TYPES AND SIZES
FOR EVERY
CONCEIVABLE
REDUCTION NEED**

No matter what your application calls for, you'll find the *right* size and type in Abart's complete line of rugged, compact Speed Reducers. Spur, worm or combination models can be furnished with any desired shaft arrangement—single or double reduction units, fractional to over 400 hp.—ratios to 10,000 to 1. All are oil-tight and dust-proof construction, made from finest heat-treated steels and gear bronzes.

For efficiency, long life, and economical service, choose an Abart Speed Reducer.

Send now for Abart's handy pocket size engineering data book and catalog.

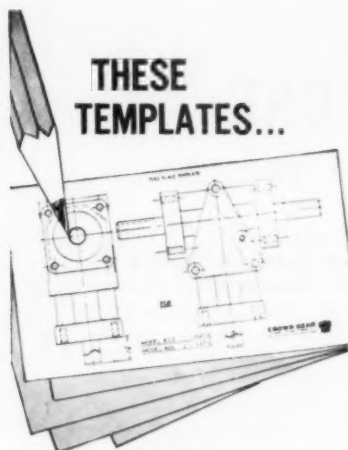


ABART GEAR and MACHINE CO.

4833 WEST 16th STREET • CHICAGO 50, ILLINOIS

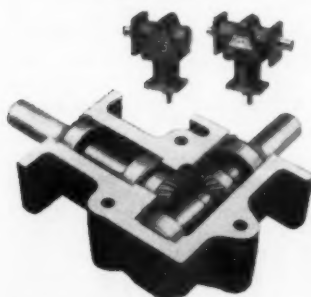
Circle 1 on Reader Service Card

POWER TRANSMISSION DESIGN



**THESE
TEMPLATES...**

**THIS
CROWN
"PACKAGE"**



**wrap up
your right-angle
design problem!**

... And the transition to the "Package" concept of right-angle power transfer is that simple with this easy-reference template kit. 18 basic Crown right-angle units are shown on six template sheets, each full scale.

WHY spend countless hours on research and drawings? **WHY** purchase expensive patterns, core boxes, castings, steel and other materials? **WHY** manufacture fixtures and gages? **WHY** machine, inspect, assemble and test components?

WHY NOT OBTAIN THE IDEAL SOLUTION TO YOUR RIGHT-ANGLE PROBLEM . . . IMMEDIATELY, AND AT TREMENDOUS SAVINGS?

Your local Crown Gear Distributor (Listed in Power Transmission Design Directory) has the answers . . . and your Template Kit. Call him or consult factory.



**CROWN
GEAR**

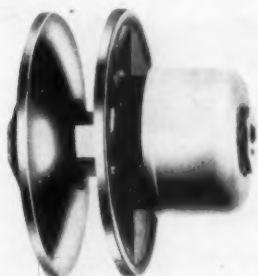
320 PARK AVE., WORCESTER 10, MASS.
A Division of Harrington & Richardson, Inc.

Circle 14 on Reader Service Card

May, 1961

Metal/fiberglass pulley

Variable speed pulley uses sheet metal steel facing into which nylon fiberglass is molded, using a



bond of 10 tons to the sq. in. The fiberglass has a tensile strength of 20,000 pounds psi—equivalent to medium grade cast iron. The hub section is also made of nylon so there's no shaft lubrication needed.

Rampe Mfg. Co., Cleveland, Ohio.

Circle 252 on Reader Service Card

Automatic clutches

For use on gasoline engines from 1 to 100 hp, these Centri-Dyne clutches have a full 360 deg. of friction surface, sealed ball bearings and an improved shoe construction in which the shoes are positively anchored to the driving side of the clutch and held in tension by two pre-set springs. A vented stamped steel housing improves cooling.

Salsbury Corp., Los Angeles, Calif.

Circle 253 on Reader Service Card

Shaft collar

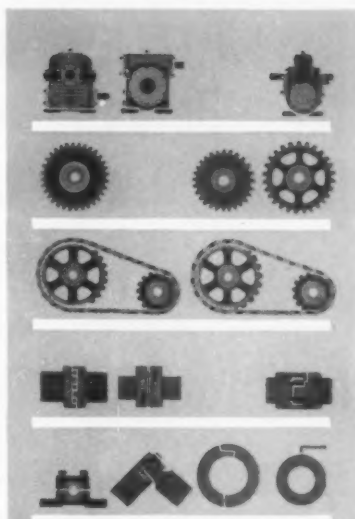
A conical shaped split inner ring and locking retainer ring are combined in the Taper Lock Shaft Collar. The split inner ring locks into the shaft, eliminating turned shoulders. Quick assembly is completed



by the tapered fit of inner ring and retainer. The collar withstands high thrust loads in one or both directions. All sizes up to 4 in. dia., external or internal types.

Bearing Accessories Co., Mentor, Ohio.

Circle 254 on Reader Service Card



INSTANT SOURCE

Charles Bond's large factory and distributor stocks provide an ideal "instant source" for Power Transmission Equipment for today's replacement and design applications. Frequently, the use of a Bond stock component eliminates the need to create a new component—with attendant delay and expense. When required Bond does create special units to your specifications.

Remember Bond—a leader in the power transmission field for three quarters of a century.



SEE YOUR NEAREST BOND DISTRIBUTOR

or check with Charles Bond Co. for: speed reducers—gears—flexible couplings—sprockets and chains—universal joints—collars—pillow blocks.

Write for Catalog No. 100

**CHARLES BOND
COMPANY**

617-23 Arch Street, Phila. 6, Pa.

Circle 10 on Reader Service Card

Don't let these Devils INTERFERE with OPERATING PERFORMANCE



Troublesome maintenance and lubricating problems are eliminated when you specify Thomas "All-Metal" Flexible Couplings to protect your equipment and extend the life of your machines.

Like a thief in the night an inadequate coupling causes wear and damage to your machines—resulting in high maintenance costs and costly shut-downs.

NO MAINTENANCE

NO LUBRICATION

NO WEARING PARTS

NO BACKLASH

UNDER LOAD and MISALIGNMENT only THOMAS FLEXIBLE COUPLINGS offer all these advantages:

- ▶ Freedom from Backlash
- ▶ Torsional Rigidity
- ▶ Free End Float
- ▶ Smooth Continuous Drive with Constant Rotational Velocity
- ▶ Visual Inspection While in Operation
- ▶ Original Balance for Life
- ▶ Unaffected by High or Low Temperatures
- ▶ No Lubrication
- ▶ No Wearing Parts
- ▶ No Maintenance

Write for our New Engineering Catalog 60

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.

Circle 52 on Reader Service Card

LITERATURE

on drives and components

To get free copies of the following literature, use the Reader Service Cards bound into this issue.

Stamped gear catalog

Sixteen-page Catalog No. 6011 illustrates various types available, tabulates critical specifications for many sizes of stamped gears, segments, internals, ring gears, crown gears, sprockets and ratchets. Includes data on center hole shapes, tooth parts, and diametral pitch rules and formulae for spur gears. Also shows some examples of special stampings and assemblies and special tools and gages. *Winzeler Mfg. and Tool Co., Chicago, Ill.*

Circle 301 on Reader Service Card

Miniature bearing catalog

Catalog 3E describes all standard miniature bearings in the RMB line—radial Filmo seal, radial Ultra-Light, radial Conrad, radial flanged pivot, miniature roller and special type bearings. Installation photos, dimensional data, actual size drawings, and cross sections. *Landis & Gyr, Inc., New York, N. Y.*

Circle 302 on Reader Service Card

Universal joints

Catalog No. 61 covers standard and heavy duty types in both single and double joints. Heavy duty types operate at speeds to 1750 rpm. Singles can be operated through a full working angle of 40 degrees and doubles through 80 degrees. Specification tables, construction details and some information on special types and a new line of booted U-joints. *Lovejoy Flexible Coupling Co., Chicago, Ill.*

Circle 303 on Reader Service Card

Sump pump motors

Bulletin GEA-6687A, 6 pages, describes a line of sump pump mo-

tors, $\frac{1}{2}$ hp, 1725 rpm, available in standard and deluxe models. Cut-away drawings with call-outs point up construction features and a series of photos show the moisture-resistant insulation, rust-resistant shaft, and permanent lubrication system. *General Electric Co., Schenectady, N. Y.*

Circle 304 on Reader Service Card

Wall chart for chains

Quick-selection wall chart simplifies choosing pitch sizes for power transmission chains. Printed on heavy paper, chart lists design horsepower on the vertical axis, rpm speeds for the small sprocket on the horizontal axis. Intersection of any two selected combinations of these factors gives the recommended chain pitch. *Foote Bros. Gear & Machine Corp., Chicago, Ill.*

Circle 305 on Reader Service Card

Rulon and Teflon parts

Brochure #9572 compares electrical, physical, mechanical and chemical properties of Rulon and Teflon. Illustrates Rulon parts for lube free bearings, O-rings, thrust washers, etc. Also reviews engineering design services for developing special shapes and forms of Teflon and Rulon, and shows testing facilities. *Dixon Corp., Plastics Div., Bristol R. I.*

Circle 306 on Reader Service Card

Complete line catalog

Catalog GC-101-F, 24 pages, presents a complete line of V-belts, including wide range variable speed belts, Poly-V Belts and gearbelts. Also features a malleable iron bushing system which is interchangeable throughout the entire line of

sheaves pulleys, couplings and hubs; and a comprehensive line of roller chain and sprockets. *Browning Mfg. Co., Maysville, Ky.*

Circle 307 on Reader Service Card

Industrial air clutch brake

Power Flo air clutch/brake features a silicone rubber diaphragm, reinforced with fiber glass, which can take temperatures 500 to 600 F. A self-centering ring for the torque plates cuts out internal clutch drag. Engineering Bulletin No. 57A gives the details. *Mid-States Industrial Clutch Co., Wichita, Kansas.*

Circle 308 on Reader Service Card

Axle products book

Four replacement folders for company axle products book give details of the tandem suspension (SP-6103), the SLHD tandem axle, the SQHD tandem axle, and a complete line of trailer axles. *Rockwell-Standard Corp., Detroit, Mich.*

Circle 309 on Reader Service Card

Locknut design manual

ESNA Design Manual No. 6101 includes 12 tables listing recom-

Circle 18 on Reader Service Card

ELIMINATE BREAKDOWNS due to OVERLOADING



Ideal for use in conveyors, presses, farm machinery, construction equipment, material handling machines and applications of power transmission equipment.

- ALL STEEL CONSTRUCTION
- FEWER PARTS
- TORRINGTON NEEDLE BEARINGS LUBRICATED FOR LIFE

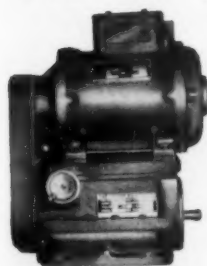
TERRITORIES AVAILABLE FOR DISTRIBUTORS

DALTON
gear company

212 COLFAX AVE. N., MINNEAPOLIS 5, MINN.

Manufacturers of
GEARS
SPROCKETS
COUPLINGS
ROLLER CHAIN

1½ HP VARIABLE SPEED 0-350 RPM



Stock #PMT-350

Now own this Heavy Duty Machine at a fraction of its true value!

SATISFACTION GUARANTEED or MONEY BACK!

Incorporates A Powerful 6-to-1 Torque Multiplier
For High Torque Applications Such As:

- Conveyors
- Machine Tool Drives
- Faner Machines
- Dairy Machines
- Elevators
- Winches
- Pumps
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1½ horsepower capacity (continuous duty). Complete with totally enclosed motor, 220 volt, 60 cy., 3 ph., A.C. Output speed reversible in either direction from 0 to 350 RPM. Forward and reverse speeds can be the same or different. Speed is smooth and constant. Ideal for continuous reversing! Precise effortless speed selection. Neutral off position. Controls easily altered for remote control. Ball and Roller bearing throughout. Extremely compact and self contained; size 21½" L, 9" W, 20½" H, 200 lbs. Output shaft 1" dia., 2½" long with standard keyway. Shipped complete with full instructions and service manual.

Other motors optional at: 220/440 V., 60 Cy., 3 Ph. add \$37.50
additional cost. 220 V., 60 Cy., Single Ph. add \$36.75

SUPPLY LIMITED! ORDER DIRECT FROM THIS AD

Write, wire or phone TAYLOR 9-1365

ROBERTS ELECTRIC COMPANY, Dept. PT-145

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Circle 46 on Reader Service Card

May, 1961



looking
for
STRONG
and
economical
CHAIN?



LOCKE
STEEL
PINTLE
CHAIN

THE LOCKE STEEL
CHAIN COMPANY
HUNTINGTON, IND.

Circle 36 on Reader Service Card

Circle 7 on Reader Service Card

STEELGRIP

GEAR and WHEEL PULLERS

FOR
OVERHAUL
AND
REPAIR

Quickly and easily pull gears, wheels, pulleys and bearings off of shafts without damage or breakage.

Improved designs make them easy to set up and safe in use.

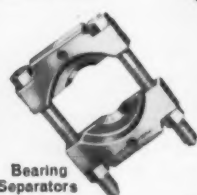
27 types, 61 sizes—2-arm, 3-arm, standard and special STEELGRIP Pullers with drop forged arms and heat treated screws.



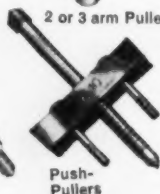
2 or 3 arm
Reversible Pullers



2 or 3 arm Pullers



Bearing
Separators



Push-
Pullers

Write for
Catalog and Prices

ARMSTRONG-BRAY & CO.
5328 Northwest Highway • Chicago 30, Ill.

LITERATURE

mended torque values for thin and standard height UNC and UNF hex type elastic stop nuts. Discusses factors in selecting a tightening torque, and the effects of lubricants. *Elastic Stop Nut Corp. of America, Union, N. J.*

Circle 310 on Reader Service Card

Interchange belt guide

Guide lists outside circumference, top width and number of links of Manheim Variable Speed Belt for equivalent sizes of rubber belts and wood block belts. Data on how to measure, how to install and how to compute price of Types I through V MVS belt is included. *Manheim Mfg. and Belting Co., Manheim, Pa.*

Circle 311 on Reader Service Card

Variable speed drive

Catalog G-100, 88 pages, covers the complete line of Vari-Speed Motodrives, $\frac{1}{4}$ through 40 hp. Data includes full rating tables, with new additional output speeds; and di-

mension diagrams and charts for over 100 different assemblies, new overhung load and new controls. *Reliance Electric & Engineering Co., Cleveland, Ohio.*

Circle 312 on Reader Service Card

Adapter ball bearings

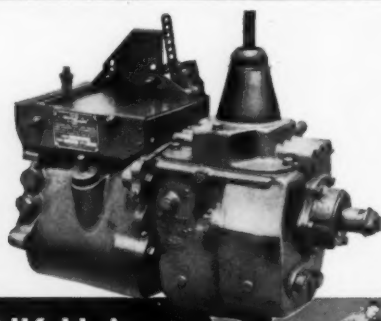
Adapter bearings for farm instruments make it possible to use pre-lubricated sealed precision bearings on ordinary steel shafting without special machining. Dimensions of Types TE and WE, available with stamped steel flanges. Product Bulletin DPB-5M. *New Departure Ball Bearings, Bristol, Conn.*

Circle 313 on Reader Service Card

Electric clutches, brakes

Six-page fold-out gives illustrations and cross-section drawings of a wide range of sizes and types of electric clutches and brakes including fixed field combination clutch brake and duplex types. Also fixed field couplings, clutch couplings and coupling brakes, brushes and combined clutch/sheave designs. *Simplotrol Products Corp., Worcester, Mass.*

Circle 314 on Reader Service Card



FUNK Units
give this tractor
EXTRA
performance!



Smooth, instant power shifting — both forward and reverse — with just one lever!

And this FUNK Revers-O-Matic® Drive installation provides neutral speed control for Napco, leaves driver's hands free for other operations.

Just one example of how FUNK MODULAR POWER UNITS may be combined — in an unlimited number of arrangements — without special engineering costs.

Let FUNK solve your power transmission problem.

FUNK MFG. CO.

Box 577-G,
Coffeyville,
Kansas

Circle 27 on Reader Service Card

WHAT'S YOUR PROBLEM?

Is it any of the following?

- Diminishing output due to a progressive drop in rpm.
- Too much down-time because of the need for frequent adjustment due to belt stretch.
- Excessive maintenance time and expense.
- Poor belt and bearing life.
- A drive in an inaccessible or isolated location.
- A high-ratio short-center drive.

MOUNTING THE MOTOR ON AN "AUTOMATIC" BASE MAY PROVE TO BE A SIMPLE AND ECONOMICAL SOLUTION

Motor mounting position and direction of pulley rotation are immaterial.

Stock Sizes
 $\frac{1}{4}$ to 125 HP.
for NEMA frames
56 through 505
and 445-U



Larger Sizes
for motors
up to 500 HP.
and for motors
having one or
two outboard
bearings.

AUTOMATIC MOTOR BASE CO.
WINDSOR, N. J.

Circle 6 on Reader Service Card

POWER TRANSMISSION DESIGN

Consult MICRO

Specialists In The
Design And
Production Of...

Worms & Worm Gears

■ Designing a new product or improving an old one... MICRO'S specialized talent and machines give you more accurate, dependable worms and worm gears at far less cost!

MICRO has designed and produced millions of worms and gears in an endless variety of styles for all sorts of applications. Their production wise engineers help find important design savings and, their highly tooled machines save money and assure uniform accuracy.

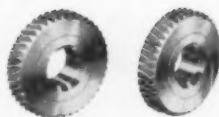
MICRO WORM & WORM GEAR STANDARDS

Types:	Throated, plain and helical gears to 12 D.P. Single or multiple thread worms.
Materials:	Steel, cast iron, bronze and special materials.
Pitch Diameter:	Runout held to .002" total indicator reading.
Tooth Thickness:	Held to .003".
Tooth Bearing:	Controlled for length and position to suit your conditions.
Thread Lead:	Held to .001" per inch of length.

Get the full story on MICRO before you buy..

Floor Polisher Drive

Throated type worm gear made from continuous cast bronze tubing.



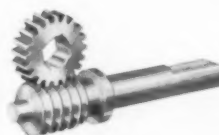
Garage Door Operator Drive

Conventional 24:1 reduction using a 1" PD stress proof steel worm and, 2" PD bronze worm gear.



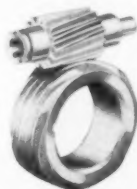
Jalousie Window Operator

A hardened, cyanide treated, single lead worm with a hardened 1040 treated steel spur gear. Reduction is 20:1.



Transmission Overdrive Governor

This 2:1 reduction drive uses a 2" PD worm and 3/4" PD helical spur gear both made of case hardened steel.



Micro Packaging Stops Gear Damage

In transit or storage this unique packaging system prevents worm and worm gear damage and provides faster, easier handling.



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of fine and medium
pitch gears

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MEN

of the power transmission field

Philadelphia Gear appoints new v.p.



Kron

Harold O. Kron has been named vice president in charge of engineering of Philadelphia Gear Corporation, King of Prussia, Pa.

Kron, a member of the American Society of Mechanical Engineers, joined the firm in 1948 and has been serving as chief engineer prior to this appointment.

Gates adds field engineer in Buffalo

William T. Devens, Buffalo, New York District, a graduate of Syracuse University, was district sales supervisor for Armour Alliance Industries, Alliance, Ohio. He has joined the Gates Rubber Company as an Industrial Division Field Engineer.

T. B. Wood's appoints two in sales

Bill W. Parsons has been appointed district sales manager of the newly created Charlotte-Raleigh sales district for T. B. Wood's Sons Co., Chambersburg, Pa. Richard A. Teague assumes responsibility for the Raleigh territory as a field sales engineer. The Raleigh territory includes the eastern half of North Carolina and eastern and central Virginia. Parsons will concentrate his efforts in central and western North Carolina and northern South Carolina and will also oversee the activities of the Raleigh territory.

Parsons is a graduate of Clemson College with a B.S.M.E. degree. He has been with Wood's since 1957. Teague holds a B.S.M.E. degree from North Carolina State.

Warner Electric promotes Witmer advertising manager

Richard C. Witmer, named manager-advertising and sales promotion for Warner Electric Brake & Clutch Company, Beloit, will be responsible for coordinating the company's advertising, sales promotion and public relations activities.

Witmer joined Warner Electric six years ago as a sales engineer.



Witmer



Evans

Worthington appoints sales manager

Lewis M. Evans, appointed Eastern region resale sales manager, marketing division, Worthington Corporation, is responsible for the marketing of Worthington products to original equipment manufacturers and franchised distributors throughout the Corporation's district office territories of Boston, New York, Philadelphia and Washington, D. C.

Evans joined Worthington in 1936 shortly after graduation from Cooper Union Institute of Technology in New York with a B.S.

degree in electrical engineering. He was manager of sales at Worthington's Standard Pump Division in East Orange, New Jersey since 1955.

A professional engineer licensed by the States of New York and New Jersey, he is a member of the National Society of Professional Engineers, the American Society of Mechanical Engineers and the American Institute of Electrical Engineers.

Goodall joins Industrial Tectonics



Goodall

John D. Goodall joined Industrial Tectonics, Inc. as general manager of the Ball Division in Ann Arbor, Michigan. He succeeds Helmut F. Stern who remains as president of both the Ball and Bearing

Divisions.

Goodall was for 10 years on the staff of Stevenson, Jordan, & Harrison, management consultants in Chicago; assistant to the president of Northwestern Steel & Wire Co., and head of his own management consulting firm before joining Industrial Tectonics.

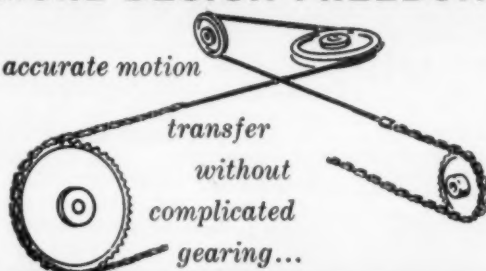
He graduated from Purdue University in 1934 with a degree in mechanical engineering.

Foote Bros v.p. to assist president in administration

Roland W. (Jack) Johnson, vice president of Foote Bros. Gear & Machine Corporation, has been given the additional duty of administrative assistant to the president in marketing areas, it was announced by James R. Fagan, President.

In July, 1960, Johnson was appointed vice president and general manager of David Brown-Foote Gears Ltd., Toronto sales subsidiary owned jointly by Foote Bros. and the David Brown Corporation, Ltd., London. Fagan said that Johnson will retain this position, and will be based at Foote Bros.' Chicago headquarters.

Johnson, with long experience in the power transmission field, has been a Foote Bros. vice president since 1955 when he was named sales v.p. of the firm's industrial

MORE DESIGN FREEDOM*accurate motion***SIERRA MINIATURE MECHANICAL CHAIN AND SPROCKETS...**

Provide precise, positive motion transfer through several planes simultaneously with no cable slippage...no complicated gearing. Unlimited center-to-center selection for miniature and sub-miniature assemblies in servo systems, gyro systems, special cameras, electronic equipment, and small precision instruments. Less weight, cost, maintenance—wider tolerances. Designed to operate around minimum 7-tooth sprocket with root diameter of .250 inches. Chain pitch .1475 inches; Weight .45 oz. per lineal ft. Material: stainless steel, or other materials.

NEW CATALOG

Contains useful application data, specifications, tables on chain pitch and sprocket sizes, suggestions for calculating center-to-center distance. Write for yours today.

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This new Torq-Ring drive cuts costs for rolling mill operation and maintenance. It will handle 1,000,000 inch/pounds of torque. Check these advantages—High angle torque transmission (12 to 14 degrees with maximum angle of 20 degrees).

Long life and low maintenance. All moving parts are mounted in sealed anti-friction bearings. This eliminates cost and labor to replace bronze shoes or gears on older type drives.

Less time and cost for lubrication. Sealed bearings retain lubricant. Greater flexibility and ease of installation. Alignment is not critical. Pays for itself. Saves labor, parts replacement and lubrication.

Write or call today for complete information or quotation on custom designed Koelling Universal Drives.

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TRANSMISSIONS featuring Electro-Magnetic Control

9000-B (10-10 H. P.)
TORQUE RATING:
1400 pound inches output
350 pound inches input

HORSEPOWER RATING:
5 H.P., 900 r.p.m. input
10 H.P., 1800 r.p.m. input

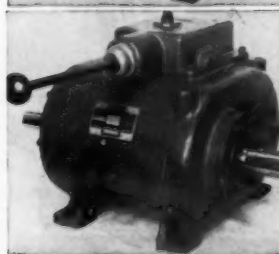
GEAR RATIOS:
1:1—2:1—3.14:1—4:1
Special ratios at extra cost
Maximum Reduction 5.07:1



8100-B (10-20 H. P.)
TORQUE RATING:
700 pound inches input
2500 pound inches output

HORSEPOWER RATING:
10 H.P., 900 r.p.m. input
20 H.P., 1800 r.p.m. input

GEAR RATIOS:
1:1—2:1—3.14:1—4:1
Special ratios at extra cost
Maximum Reduction 6.00:1



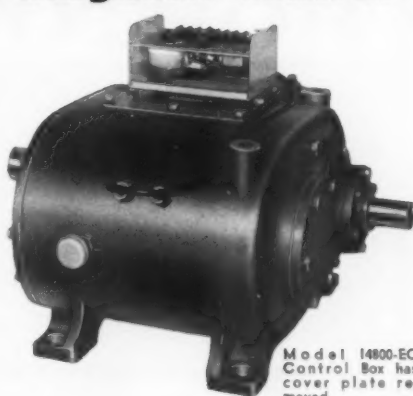
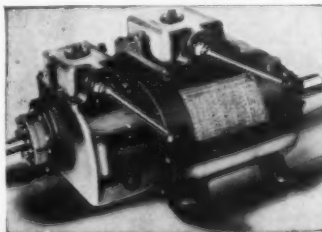
14800 (left)—Four special speed changes up to limit of case 10:1
14900 (left)—Four speed changes in geometric progression at 1.71 (total reduction of 5.09)

TORQUE RATING:
1400 pound inches input
7500 pound inches output

HORSEPOWER RATING:
20 H.P., 900 r.p.m. input
40 H.P., 1800 r.p.m. input

Transmissions with Electro-Magnetic Clutches provide speed changes and reversing under power, without interrupting power source...so equipped are available with two to eight speeds, capacities from 52 to 750 foot pounds and a wide ratio selection (up to 10:1). Manual or automatic controlling of speed changes accomplished with electric switches, tape, cam or other remote control means available. Especially adaptable to automatic machinery where transmission is not accessible to the operator.

9300 (30-40 H. P.) below
TORQUE RATING: 2100 lb. in. input; 12,000 lb. in. output.
H.P. RATING: 30 H.P. at 900 R.P.M. 40 H.P. at 1800 R.P.M. Eight Speed Changes in geometric progression of 1.29 (total reduction 8:1) Special ratios at extra cost.



Model 14800-EC Control Box has cover plate removed.

Transmissions both standard and specially engineered for industrial and agricultural machinery, automotive trucks, tractors, refuelers, industrial shovels, cranes, shop and lift trucks, concrete mixers, road builders, diamond drills, machine tools...

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WESTERN MANUFACTURING CO. — 3400 SCOTTEN AVE. — DETROIT 10, MICHIGAN

MEN

gear division. He was vice president in charge of national accounts at the time of his appointment to head the Toronto subsidiary.

Norman Leeds dies; Raybestos-Manhattan official

Norman Leeds, Jr., of Bridgeport, Connecticut, assistant general manager of the Raybestos Division of Raybestos-Manhattan, Inc., Stratford, Connecticut, died suddenly on March 12 at the age of 59. Leeds started with the Raybestos Division in 1923 and successively served as process engineer, assistant sales manager, sales manager, factory manager, and since 1956 as assistant general manager. He was elected to the Board of Directors of Raybestos-Manhattan, Inc. in 1955.

Formsprag names project engineer

Formsprag Company, Warren (Detroit), has named Ralph J. Ras-

mussen project engineer for its line of Rev-Lok dual torque-locking and positioning devices, according to an announcement by Roger L. Daniels, chief engineer of the company.

Rasmussen takes over his new assignment with 10 years' engineering experience, principally in the automotive industry.



Rasmussen



Brown

Brown named vice president of Philadelphia Gear

William T. Brown has been named vice president in charge of manufacturing of Philadelphia Gear Corporation, King of Prussia, Pa.

Brown joined the firm in 1934 and has served in the capacities of foreman, plant superintendent and since 1948 as plant manager.

Fort Worth Steel & Machinery Co. appoints two

Fort Worth Steel & Machinery Company announces two new sales assignments; Phillip Thompson, becomes Great Lakes regional sales manager and Wayne Doyle, Kansas City district sales engineer.

Thompson moves from Detroit, where he was original-equipment-manufacturer sales engineer for the Dayton Industrial Products Company for several years. Previously during his 12 years in the power-transmission field, Thompson was industrial sales manager of McLaughlin Ward Company, industrial distributor in Jackson, Mich. He is a graduate of Purdue University.

Doyle was a member of FWS&M's central engineering department prior to his Kansas City assignment.

Worthington's new resales manager

Joseph E. Siebold has been appointed manager, administration, resale department of Worthington Corporation's Marketing Division.

HORTON



NEW! "AIR-CHAMP" CLUTCHES*

have built-in rotary Air joint! Mount anywhere!

A combination clutch and sheave, the "Air-Champ"* automatically tunes trouble out of starting problems. Gives shockless starts! Installs easily...anti-friction bearings... "V" belt or pilot adapter type drive... control with static air pressure. 2 models; up to 800 inch lbs. of torque. Write us for brochure. *Patent Pending

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NOW...you can get LOW COST DARCO SPROCKETS

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41, 50



Standard types from stock. Special types and designs at low cost... fast delivery.

Write for DARCO SPROCKET CATALOG No. 2 or send specs on special sprockets for prompt quotation.

DAYTON ROGERS
Manufacturing Company

Minneapolis 72, Minnesota

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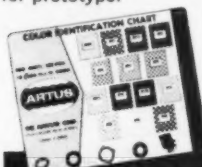
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NEW THE COLOR TELLS THE THICKNESS

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Controlled tensioning eliminates shock loading through excessive chain vibration, and horsepower loss through belt slippage.



- ROTATING ARM ACTION FOR GREATER ADJUSTMENT
- FULL 360° POSITIONING

A low cost tensioner for single and multiple width drives that is more adaptable to machine frames. See your Power Transmission Distributor or write...



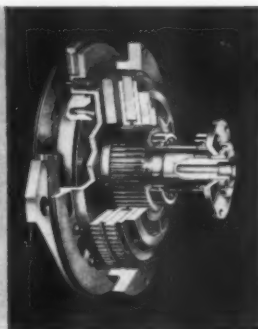
BREWER MACHINE & GEAR CO.
1441 N. 2nd St. St. Louis 6, Mo.

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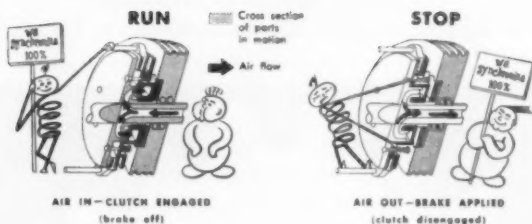
May, 1961

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MINSTER Combination Clutch and Brake



**Air-Operated • Compact
Fast-Acting • Perfectly Synchronized**



The Minster patented Combination Air Friction Clutch and Brake unit offers these advantages for original equipment use.

- Controlled single or multiple cycling within a wide range of speeds
- Clutch and brake in single, synchronized unit
- Adaptable to mounting on crank, cam or drive shaft for flywheel or geared applications
- Can be used with flywheel, gear or drive-spider and mounted outboard or between bearings
- Constant or variable clutch torque
- Compact, space-saving, easily installed
- Minster Electrical Controls to your requirements

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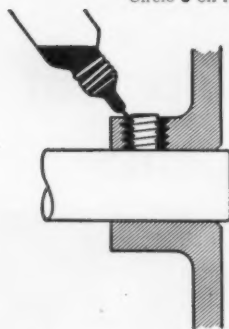
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Circle 3 on Reader Service Card



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and a
set screw
stays put!**

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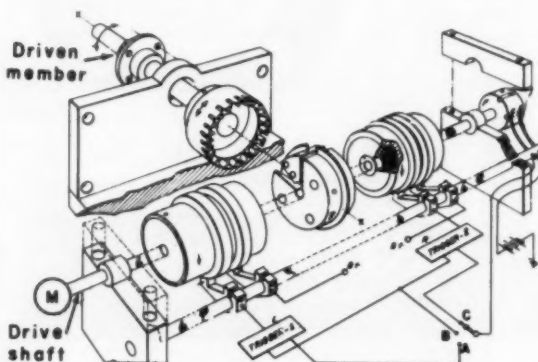
Circle 44 on Reader Service Card

PATENTS

Reversible drive mechanism

U. S. Patent No. 2,962,913; Harold F. Martin, San Jose, Calif., assignor to International Business Machines Corp., New York.

A reversible, right-angle drive mechanism with a resilient disc mounted on the drive shaft engaging with

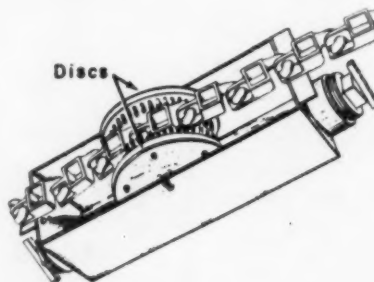


teeth on the end of the driven member. The disc has an incision on its periphery, and means of twisting it to form either a left- or right-handed single convolution thread.

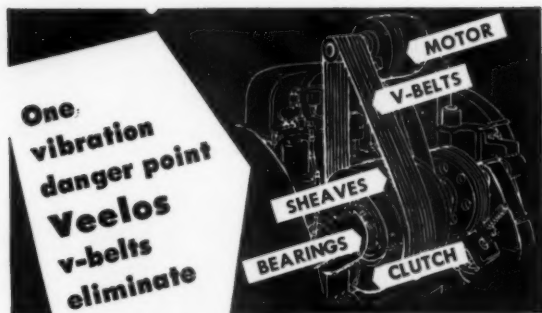
Chain lubricator

U. S. Patent No. 2,893,516; Joseph J. Bocchino, Rockaway, N. J.

An open trough for continuous lubrication of moving chain. Ends of the trough are bent to form supports



for the chain. A revolving wheel, carrying two rows of brushes, is adjustable so that these brushes always carry lubricant to all surfaces of the chain.



On any drive there are five vibration danger points—motor, bearings, clutch, sheaves and v-belts. One, the vibration from v-belts, can be eliminated by a simple switch to Veelos. An easy-to-make test with the Veelos Vibration Analyzer measures one belt against another. It will prove to you that Veelos cuts v-belt vibration up to 89% more than any other type of v-belt.

Ask your distributor—or write direct—to have a Veelos salesman demonstrate how vibration-free Veelos v-belts on your drives will bring higher production, higher quality output with less wear on bearings and machines.

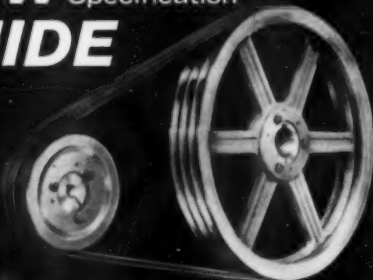
SEND FOR your free copy of the Veelos Data Book



MANHEIM
Manufacturing & Belting Company
Manheim 9, Penna.

Veelos is known as Veelink outside U.S.A.

NEW Engineering and Specification GUIDE



FORT WORTH MULTIPLE V-BELT DRIVES Using QD SHEAVES

with interchangeable tapered split bushings. Quick, easy installation and removal. Positive press fit. Same bushings used in Fort Worth QD Sprockets. New 64-page bulletin includes complete data for selection of stock and non-stock multiple V-belt drives, and specifications of A, B, C, and D section sheaves and V-belts. Ask your Fort Worth Distributor for free Catalog Section 50-C, or Write to Dept. PTD, Fort Worth Steel & Machinery Co., Fort Worth 1, Texas.

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LIMA variable speed drive

LIMA'S multi-speed transmission, as a component of the VARIABLE SPEED DRIVE, delivers this greater output torque . . . at no more cost than comparable 2 to 1 ratio units.

- 120 through 1200 RPM with a 1200 RPM motor
- 180 through 1800 RPM with a 1800 RPM motor

Dripproof or Totally Enclosed Fan-Cooled

for additional information write:
Darrel Bryan
general sales manager

LIMA

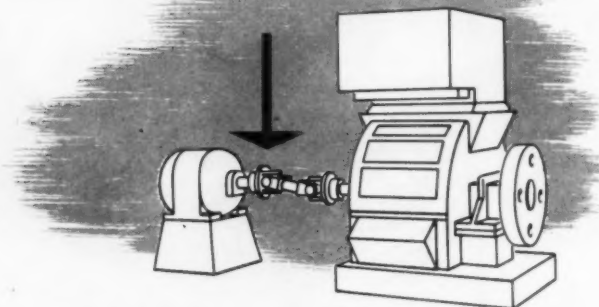
- ELECTRIC MOTORS
- GEARSHIFT DRIVES
- VARIABLE SPEED DRIVES
- GEARMOTORS
- STRAIGHT LINE REDUCERS
- SHAFT MOUNT REDUCERS
- GENERATORS



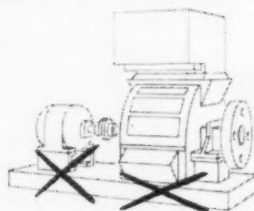
THE LIMA ELECTRIC MOTOR CO., INC.
LIMA, OHIO

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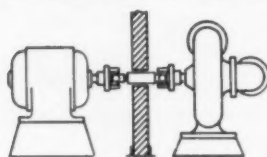
How to make "MISALIGNMENT" profitable with WATSON Drive Shafts



A WATSON drive shaft working at any angle from 1 to 8 degrees transmits power as efficiently as a flexible coupling, yet offers substantial savings in design engineering time and installation cost. Angles up to 20 degrees can be handled (depending on RPM). No painstaking axial alignment is required; simple, low-cost concrete foundations poured on the site replace costly unit base plates.



In addition, the use of Watson drive shafts offers:



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of driving and driven elements for best utilization of space, distribution of weight, isolation of motor or engine, provision for maintenance or working space.

PROVISION FOR RELATIVE MOVEMENT

between driving and driven elements, either intentional or as a result of structural deflection or foundation shifts.



WATSON drive shafts are promptly available in 9 sizes, 10 to 800 h.p., for speeds to 4,000 r.p.m. and more. Why not get the facts—now? New 8-page Engineering Data Bulletin F-15a is yours for the asking; please address Dept. 150



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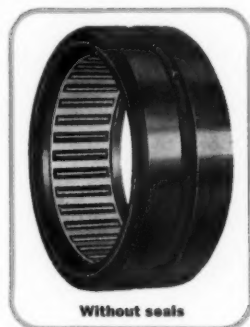
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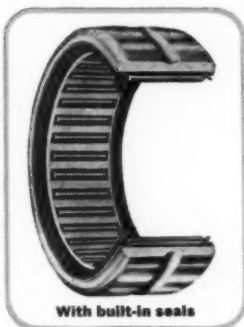
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With built-in seals

ORANGE *Cage Type* NEEDLE BEARINGS

Precision needle rollers are permanently aligned in pockets of anti-friction cage—resist skewing while running in vertical, tilted or horizontal position. Successful on overhung mountings; less affected by misaligned mountings or shaft deflections. Sizes, without seals, $\frac{1}{2}$ " to 8" shaft dia.; with built-in seals, $\frac{1}{2}$ " to 2" shaft dia.

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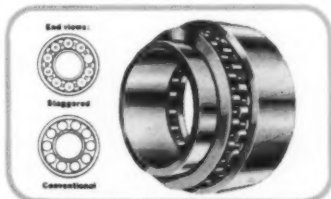
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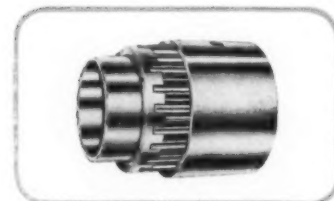
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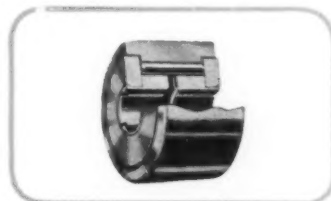
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Send for 48-page Engineering Reference Manual
showing dimensions, capacities, installation
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• **What he wants you to know is this:** "Machines used outdoors in winter need oil that isn't affected by the cold." Well if that's what he meant, why didn't he say so? Good question. The reason you have to hack your way through doubletalk in some technical and business magazines is that writing things clearly and simply is hard work—a lot harder and much more expensive than putting them down in technicalese (the special language of engineers and longhairs.) The odd part of this problem is that even the longhairs who *write* technicalese don't like to *read* it. That is why the articles in this magazine have been distilled.

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• **WHAT'S DISTILLED WRITING?** It's copy with the extra words squeezed out. It gives each article exactly as much space as it really needs . . . not one line more! This isn't a digesting process: all the facts are still there, but the verbiage is gone. For example, we take this kind of writing . . . and distill it to this:

eliminate unwanted vegetation	kill weeds
It is used to rupture missile frames in flight to initiate aerodynamic distintegration.	It makes missile frames explode in flight.
formation of iron oxide binding the two surfaces	rusted together

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